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TROUT SLOPE

Landscape Assessment

June 1996

Vernal Ranger District
Ashley National Forest
U.S. Dept. of Agriculture

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Trout Slope Landscape Assessment

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INTRODUCTION

THE TROUT SLOPE LANDSCAPE

The Trout Slope landscape area is located on the Vernal Ranger District of the Ashley National Forest. The area encompasses about 80,000 acres, stretching from Grizzly Ridge on the east to Hacking Lake on the west (Fig. 1).

Trout Slope is an extremely popular and heavily used area for residents of the Ashley Valley. Hunting, camping at dispersed and developed sites, firewood gathering, and ATV travel are among the most popular recreational activities.

Besides its popularity with local residents, the Trout Slope area is also unique in its vast expanses of mature lodgepole forest, most of which was killed in the 1980s by an epidemic of the mountain pine beetle. The beetle-killed lodgepole changed the picture of the landscape, turning a green forest mostly gray. Besides the obvious visual effects, the epidemic has had other consequences. The dollar value of marketable timber has steadily declined as the dead trees remain unharvested. As dead trees have fallen, the risk of catastrophic fire has risen. The mix of habitats for wildlife has undergone dramatic shifts, affecting available hiding cover, forage, and safe travel routes.

Timber harvest was accelerated in the mid to late 1980s in an attempt to recover the economic value of the dead lodgepole. A patchwork of clearcuts, new and old, stocked and unstocked with regeneration, now dominates much of the Trout Slope landscape. As more timber is salvaged, resource thresholds such as water quality and wildlife hiding cover could be challenged by the cumulative effects of intense harvest activities.

WHY FOCUS ON TROUT SLOPE?

In 1994, the Vernal Ranger District began a purposeful exploration of ways it could implement ecosystem management. With the understanding that ecosystems occur at an infinite number of scales and that by definition do not respect administrative boundaries, the district 'drew lines' around five areas encompassing the Vernal District.

The lines were drawn on the basis of several factors ranging from bio/physical features (e.g. landtypes), to human use patterns. For all the reasons mentioned above, Trout Slope easily rose to the surface as the area in the most immediate need of assessment.

Soon after it chose the Trout Slope landscape to assess, the Vernal District asked Ashley Valley residents their thoughts on the values and management schemes at work in the Trout Slope area (see Appendix 1) . Public interest focused on wildlife management, recreation opportunity and experience, and commodity uses of the land (timber, grazing, and water production). Comments generally reflected the feelings of society-at-large, as described in Forest Service

Values Poll Questions (Hammond 1994); and Results from a Nationwide Survey on Forest Management (Frederick/Schneiders 1994).

The comments that focused on general expectations of the landscape were used to refine the Desired Condition for Trout Slope (see Overview section of Chapter 2). Those that focused on specific concerns (e.g. the water pipe at Kaler Hollow, logging traffic, etc) will be addressed individually by district personnel in the spring of 1996.

The increasing popularity of the Trout Slope landscape, combined with the resource management challenges described, present managers with a daunting question: How do we manage a landscape to provide a desired, sustainable flow of commodities and experiences within its natural capabilities to produce them?

THE FOREST PLAN

The Ashley National Forest's Land and Resource Management Plan (Forest Plan) describes, in very general terms, the desired condition of the forest (pp IV- 3-4). It also classifies lands within forest boundaries into Management Areas. Management Areas were delineated by a model (FORPLAN) which defined areas by what resource could be optimally produced from a given piece of ground, given such variables as potential yields, economic factors, human-imposed resource constraints, etc. Management Areas range in size from just a few acres to several thousand acres. The Trout Slope landscape alone contains several different management areas, scattered in dozens of fragments. The same Management Area can occur several times across any given landscape. Each Management Area is described by a prescription which generally emphasizes one resource over others. Each resource has its own set of goals, objectives, and standards and guidelines. Resource goals, objectives, and standards and guidelines provide managers a list of parameters which 'set the ground rules' for implementing projects on-the-ground.

Here's an example of a Management Area which occurs frequently on the Trout Slope landscape:

Management Area 'f'

- Prescription: Dispersed Recreation Roaded
- Resource Emphases (examples only; not all-inclusive):
  - *Recreation* - VQOs at inventoried standards. Dispersed recreation is favored over other resources. Travel plan will be used to protect resources while permitting access. Standard service level.
  - *Wildlife* - Improvements designed to enhance recreation opportunities and optimize species diversity. Key or critical areas will be emphasized.
  - *Timber* - Harvest designed to enhance recreation, wildlife, and visual opportunities. Transitory range allocated to wildlife.

Management direction in the Forest Plan is almost exclusively anchored to a particular resource, as opposed to a piece of land delineated by its ecological components.

The significance of this is that it leaves land managers with many unanswered questions. Among them: How can I design this project within the range of the land's capabilities to recover from the effects? Can I design it in a way that enhances the function of other resources? What is the effect of this project on the functions of the surrounding landscape? What kind of project can I develop that moves the landscape toward a future in which a sustainable flow of various outputs can be achieved?

The challenges facing managers on Trout Slope are complex and interdependent. Because of its structure, assumptions, and focus, the Forest Plan is limited in its ability to provide direction in an integrative, ecologically-based context. An additional framework for understanding an ecological system, its capabilities and functions, was needed.

LANDSCAPE ASSESSMENTS

The Trout Slope Landscape Assessment offers managers a look at the capabilities of a landscape on a scale that provides a more meaningful context than the current Forest Plan. What does the assessment offer that the current Forest Plan does not? It describes a given piece of ground by its physical, biological, and social components. It describes it also by its history of patterns of disturbance (fire, insects, disease, etc). And it describes these things in a manner which recognizes the interconnectedness of functions given the unique characteristics of a landscape. In other words, it attempts to be more holistic in its perspective. The value of this is that it gives land managers a better context (in both time and space) for their decisions. Not only can it be used to better evaluate the effects of proposed projects (analyzed through the NEPA process), it can be used to plan actions which will move a landscape toward a clearly defined desired condition. Finally, it provides an adaptive framework lacking in the current Forest Plan. The assumptions and models that are part of the landscape assessment can be easily monitored, measured, and changed, to effectively move toward desired condition.

why don't they amend it?

THE ANCHOR: VEGETATIVE STRUCTURE

Describing a landscape is a difficult task. The sheer volume of data which can be used to describe various scales and ecological interactions is potentially infinite. Other attempts at landscape or area assessments have seemed encylopedic, describing individual resources, seldom connecting them to each other or anchoring them to the land's disturbance patterns and capabilities. The value of these early assessments as a tool for resource managers is questionable.

The tasks ahead of the Trout Slope Assessment Team were clear: 1) focus the assessment on the resource challenges unique to Trout Slope, and 2) design the assessment so that it provides a useful, adaptive tool for land managers into the future.

The Trout Slope Landscape Assessment focuses on the vegetative component of the area. It is a subjective yet purposeful focus. Most of the resource issues facing the Trout Slope area, such as wildlife habitat, water quality, and recreation experiences are a function of the vegetative structure of the area, i.e. the trees, where they are and where they're not. Therefore, the

assessment will focus on this structure; how a mosaic of various age and size classes interacts to provide for the long term sustainability of the system and the values it represents.

CHAPTER 1

EXISTING CONDITION

The primary descriptive tool used in this chapter is the Land Systems Inventory. This is a geographical classification scheme based on an approach developed by Wertz and Arnold (1972). It is hierarchical, with the largest units occurring at continental and regional scales (domains, divisions) and the smallest units encompassing tens to hundreds of acres (landtypes). Classification is based on identifying and combining the various elements of the ecosystem (geology, landform, vegetation, hydrology, and soils) into ecological units of land with predictable patterns such as vegetation potential, wildlife and fishery habitat, recreation use, and response to disturbance (fire, wind, timber harvest, insect infestation, etc.). A more detailed description of the system is found in "Ecological subregions of the United States: section descriptions" (USFS 1994).

The Ashley National Forest has been working on descriptions of local ecological units at the section, landtype association, and landtype levels since the mid 1970s (USFS 1994, Godfrey, et al). It is this locally developed information, primarily at the landtype association (LTA) and landtype (LT) levels, which forms the basis of the existing condition and desired condition discussion in this document. Other sections of this document will elaborate on the LTA descriptions in relation to specific subject matter.

Development of ecological unit descriptions is an ongoing process. Information is added or changed as more is learned about various aspects of the ecosystem. Information from initial inventories or classifications is refined over time to be more site specific, usually through project-by-project environmental analyses.

The LTAs found in the Trout Slope assessment area are shown on Figure 2. A brief description of each is provided below (see Godfrey, et al. 1976 for more detailed information on these and other Ashley National Forest LTAs).

CLIMATE AND LANDTYPE ASSOCIATIONS

CLIMATE

The climate in the region is influenced seasonally by two different weather systems. In winter, frontal storm systems move over the Uinta Mountains from the Pacific Northwest. Precipitation is mostly snow and represents most of the total annual moisture received in the subalpine forest zone. Cold air masses periodically descend from the Arctic. Stagnant domes of high pressure may also persist, often times making conditions in the mountains warmer than the flanking basins.

In summer, the region has frequent orographic and convective thunderstorms from moisture originating in the Gulf of Mexico. These storms cover relatively small areas but can yield heavy rainfall and high winds. Snowtell data for the Uinta Mountains show March as a peak period for precipitation after which precipitation gradually decreases until June, which is typically the driest summer month. From July to October, there is a trend of increasing precipitation. October is somewhat comparable to March as a peak period for precipitation. This is followed by a trend of decreasing precipitation until January, which is typically the driest winter month.

The forests in the region are typically cool, dry, relatively low productivity sites compared to other areas in the Rocky Mountains. Vegetation can vary with even small differences in aspect, slope, soil, or climate.

ALPINE MORAINE LANDTYPE ASSOCIATION (AM LTA)

The Alpine Moraine LTA reaches into the Trout Slope area from the west where it is connected to the Uinta Bollies LTA (which encompasses rocky slopes and alpine areas above timberline). The AM LTA consists of land in and around the broad valleys of the North Fork and South Fork of Ashley Creek. As the name suggests, the AM LTA is associated with past glaciation. Two distinct landtypes of the AM LTA are found in Trout Slope. Both originate from Precambrian quartzites of the Uinta Mountain range.

One landtype consists of hummocky lateral moraines with a knob and kettle topography with little or no integrated drainage system. The rolling hills or knobs are home to mixed stands of lodgepole pine, spruce, and fir with a sparse understory of grouse whortleberry. Soils on the knobs are typically deep (40 to 60 inches) with a cobbly sandy loam surface becoming a cobbly clay loam below. The potholes and meadows hold sedges, bluejoint, tufted hairgrass, marshmarigold, and low growth willows, and have clay and clay loam surface soils with deep sandy clay and clay loam subsoils with high water tables. A portion of this landtype near Sims Peak has been designated a Research Natural Area.

The second landtype consists of hummocky ground moraines along the glacial valley bottoms. This landtype has a well-developed drainage system and contains lakes, wet and dry meadows, and drier hummocks covered with mixed conifer tree species. This landtype holds the South Fork of Ashley Creek and is bounded on the north and south by the hummocky lateral moraine landtype. Sites are typically wet sedge-grass meadows with a dark silt loam surface and silty clay loam and loamy fine sand subsurface; dry grass-forb meadows with a silty loam surface and stratified sandy loam, sand and sandy clay loam subsurface; mixed forest covered areas on larger hummocks with cobbly loam surface and cobbly sandy clay subsurface.

TROUT SLOPE LANDTYPE ASSOCIATION (TS LTA)

The Trout Slope LTA is by far the most extensive LTA in the Trout Slope area. This LTA ranges in elevation from about 10,000 feet at the crest of the Uinta Mountains to about 9,000 feet in its southern reaches. The area lacks the glacial features of the Alpine Moraine LTA but is also made up of Uinta Mountain Quartzite with the addition of some Red Pine Shale which

shows up as poorly vegetated and erosive areas throughout this LTA.

This LTA is mainly covered with mixed conifer forest of mostly lodgepole pine at the lower elevations to increasing amounts of Engelmann spruce as elevation and moisture increase. Subalpine fir is common but is rarely dominant on soils derived from quartzite . Aspen is generally lacking except on talus slopes where it out-competes conifers. Generally, soils under conifers have gravelly loam surfaces and gravelly or cobbly sandy clay loam subsurfaces.

The mountain pine beetle epidemic of the 1980s killed much of the lodgepole pine in the lower elevations of this LTA. The abundance of lodgepole, fairly rapid response of the understory, wide occurrence of charcoal in the soil, and stand patterns indicate a history of rather frequent and widespread fire. This fits the boom-bust scenario common to lodgepole forests in the West.

On upland, drier areas, grouse whortleberry is a common understory species. Along drainages and on slopes of moist soil, bluejoint grass is common or dominant under conifers. These areas have high water tables or long periods of high water tables. Regeneration of lodgepole after the mountain pine beetle epidemic of the 1980s and after timber harvest has been slow compared to drier areas, possibly because the seedbed is too cool and moist for lodgepole germination or because of bluejoint competition. A landtype has been mapped to show where this forested riparian community type is common (see Appendix 3A).

Wet and dry meadows holding grasses and sedges, such as Lake Park and Lonesome Park, diversify the tree dominated landscape. Meadows have a perched water table at least part of the year and can be extremely wet and boggy any time. Some meadows exhibit stream headcuts, gullies, and multi-rutted roads. Wet meadow soils have deep dark silt loam or organic surface layers with a silty or sandy clay loam subsurface.

PARKS PLATEAU LANDTYPE ASSOCIATION (PP LTA)

PP LTA lies below the Trout Slope LTA in elevation. This LTA is characterized geologically by broad, unglaciated, gently to strongly sloping plateaus which are usually capped with varying thicknesses of Bishop Conglomerate eroded from higher elevations.

The PP LTA supports nearly pure lodgepole forests and lodgepole forests with seral aspen (the lodgepole portions were subject to extensive mortality in the 1980's pine beetle epidemic), climax aspen forest, sagebrush/grass communities, and wet and dry meadows. Examples of all these can be viewed along a short drive on the Red Cloud Loop Road from US 191 to Big Lake.

The understory of the dense, green lodgepole pine forests of the PP LTA is often reduced to little more than a thin layer of duff. On cooler exposures, grouse whortleberry is sometimes common. Following fire, harvest, and pine beetle epidemics, a number of understory species increase. One of the most common is Ross sedge which commonly responds from a seedbank. Bluejoint is locally common along drainages and in areas of high water tables. The wet and dry meadows are similar to those in TS LTA also, except that sagebrush is usually around the

margins instead of conifers.

Soils under the lodgepole type are cobbly or gravelly sandy loams on the surface with a subsurface of cobbly or gravelly sandy clay or heavy clay. These clays indicate the presence of shales and/or very old soils. The aspen soils typically have deep, dark, organically enriched loam surfaces with gravelly loam or clay loam subsurfaces.

Wet meadows may have organic surface layers in various stages of decay or dark, organically enriched mineral layers of silt loam or clay loam. Subsurfaces are sandy clay or clay loam. There are usually no notable amounts of coarse fragments.

Typical sagebrush/grass soils have organically enriched (less than the aspen and wet meadows) loamy surfaces and sandy clay loam subsurfaces.

LIMESTONE HILLS LANDTYPE ASSOCIATION (LH LTA)

The geologic root of this LTA is mainly Mississippian Limestone. Unlike the LTAs on Uinta Mountain Quartize, where lodgepole pine is the dominant forest type, the forest types in the LH LTA are mostly Douglas-fir, aspen, and blue spruce. Non-forested communities are usually dominated by sagebrush, or by grasses and forbs in meadows within forest types. Aspen stands usually have more lush and diverse understories than conifer stands. Around Iron Springs, blue spruce is the dominant tree with an understory of common juniper, elksedge, and other species common to Douglas-fir and aspen communities.

With lodgepole scarce in this LTA, the mountain pine beetle epidemic had little effect (unlike the adjacent TS and PP LTAs). The isolated nature of Douglas-fir stands probably helps reduce the likelihood of insect epidemics that are specific to this species. Disturbances such as insect outbreaks and fires occur in smaller areas over more infrequent time periods which helps make for a more stable appearing forest in contrast to lodgepole pine forests in higher LTAs.

Soils under Douglas-fir and blue spruce stands vary greatly depending on their slope location. On upper slopes and ridgetops there is a thin soil mantle of gravelly loam. Thicker soils develop on the lower slopes from material moving down. On midslopes and toe slopes around Dyer Mountain and Iron Springs, typical soils have gravelly loam surfaces and gravelly clay loam subsurfaces.

Aspen is found in the drainages and areas having wetter, deeper, and finer textured soils . These soils have a deep loam surface enriched with organic matter and gravelly loam or clay loam subsurfaces.

Sagebrush/grass meadows are found in areas of valley fill like the Big Lake area. The soils are similar to aspen soils with the enriched organic matter surface but have silty clays and clay loams subsurfaces and relatively high water tables.

STREAM CANYON LANDTYPE ASSOCIATION (SC LTA)

The Stream Canyon LTA is a minor component of the Trout Slope area. It is comprised of the moderately to steeply sloping headward portions of the canyons of the North Fork of Ashley Creek and Big Brush Creek. It occurs in Uinta Mountain Quartzite where talus rock (coarse masses of rock fragments) is common on the sideslopes with a small number of cliffs and ledges. Outside the boundaries of the Trout Slope area, these canyons cut into Mississippian, Weber, and Morgan formations.

Most of this landtype is dominated by lodgepole pine and aspen with little in the way of understory species because of the talus slopes.

Soils on the sideslopes generally have a stony fine sandy loam surface and a stony loamy sand subsurface. Much of the finer soil materials have washed down from the sideslopes to the canyon toeslopes and bottom where deeper soils have developed. The surface of these soils are fine sandy loams with a subsurface of fine sandy clay loams.

FIRE INFLUENCE

GENERAL FIRE ECOLOGY

Lodgepole pine is the climax forest type or a persistent forest component over most of the Trout Slope area. Since lodgepole is well known as a fire-dependent species, its ubiquitous presence indicates that fire has been an important factor in shaping the Trout Slope area. This is supported by wide occurrence of charcoal in soils and stand patterns indicative of rather frequent and widespread fires.

Fire in the Uinta Mountains, where decay is inhibited by cool temperatures and dry conditions, contributes to carbon, nitrogen, and other nutrient cycling processes for the biological system.

Fire regimes in the forests of Trout Slope vary greatly. A General Technical Report, titled *Fire Ecology of Forests and Woodlands in Utah* contains a series of generalized fire regime descriptions (fire groups) developed for Utah forests based on forest habitat type, elevation, and moisture conditions (Bradley et al. 1992). These groups can be used to describe the fire ecology in terms of effects on vegetative communities, fire frequency, and fire severity of LTAs within the Trout Slope area since LTAs often correspond to fire group boundaries (Fig. 2). This General Technical Report serves as the primary reference for this section.

Lodge pole Pine

FIRE GROUP 8: TROUT SLOPE LTA BELOW 9500' ELEVATION AND PARKS PLATEAU LTA

a. Vegetative Community Description

This is one of the most widespread fire groups in the Trout Slope area. These LTAs contain climax or persistent lodgepole pine forests which are perpetuated by fire. With periodic fire, lodgepole is constantly renewed (reestablished) and continues to be the dominant forest cover

type. Fire aids lodgepole seed release from cones, creates bare mineral soils for seed germination and kills or suppresses shade tolerant species such as Engelmann spruce and subalpine fir which may otherwise overtake lodgepole under closed-canopy conditions.

Lodgepole pines form continuous, even-aged forests over extensive areas in these LTAs. Individual stand characteristics are results of previous fires. Fire features, such as time of occurrence in the year, fuel load, interval since the last fire, and weather conditions prior to, during, and following the fire, influence the nature of stands. Site differences also contribute to stand features. Dog hair stands seem more common on sites of lower productivity potential. On more productive sites, self-thinning through competition seems more common, and trees are more likely to achieve their potential size.

Aspen is frequently associated with lodgepole in the PP LTA. In some areas, it regenerates rapidly with thousands of suckers (sprouts) per acre following fire or timber harvest. Aspens contribute to stand diversity, providing an additional structural layer to the often monotonous lodgepole pine stands.

b. Fire Frequency

Prior to the last 80-or-so years of fire suppression, the fire return interval in Parks Plateau and lower Trout Slope lodgepole forests was very likely between 50 and 200 years. Extensive areas with similar-age stands (e.g., Alma Taylor Plateau, Galloway Plateau, and Mosby Mountain) and dates calculated from fire scars on live trees indicate that natural fires may have burned tens of thousands of acres in a single season or within a span of a few years around the turn of the century.

Mountain pine beetle epidemics, fire, and the biology of lodgepole pine seem closely related. The density and uniformity of lodgepole pines following fire tend to set the stage for future epidemics of mountain pine beetle. The beetle's ability to capitalize on favorable conditions over large areas in turn sets the stage for the next fire by creating large expanses of dead trees. Return intervals for mountain pine beetle epidemics are therefore presumed to be similar to that of fire.

c. Fire Severity

Fires in stands dominated by lodgepole pine tend toward one of two extremes. They may smolder and creep on the surface consuming litter and duff, or they may tend toward severe, stand replacing crown fires. Summer wildfires may exhibit both types of fire behavior depending on daily weather fluctuations, but most are low intensity fires due to the generally sparse undergrowth. Cool, moist conditions prevail under a dense, closed canopy, and fires that start here usually remain on the ground, smoldering for days or even weeks before extinguishing.

Severe fires are more likely in stands where a lot of dead fuels exist. Fire may torch individual trees or groups of trees where there are accumulations of dead fuels or mixed dead and live fuels. Fire can then burn through adjacent tree crowns aided by steep slopes and high winds. The chance of crown fire in lodgepole stands is related to the amount of heat released from

surface fuel, the height of tree crowns above the ground, and fire weather conditions.

Stand conditions determine fire potential, and these are the result of past stand disturbance. The kind of fire that occurs in the future will, in turn, determine future stand density and the rate of succession. Open stands mean a faster rate of succession.

FIRE GROUP 10: TROUT SLOPE LTA ABOVE 9500' ELEVATION

a. Vegetative Community Description

This is generally a subalpine mixed forest dominated by lodgepole with increasing amounts of Engelmann spruce and subalpine fir as elevation and moisture increase.

In subalpine forests, fire has led to dominance by one or more seral species, opened otherwise dense stands, and created a mosaic of different ages and species compositions. Where lodgepole pine or aspen occurred, higher fire frequency favored long term dominance by these species. As conifers replaced aspen, stands became increasingly susceptible to fire as succulent forbs were succeeded by woody fuel and litter.

b. Fire Frequency

Fire history data indicate that the predominantly cold, moist conditions probably lead to fewer lightning fires in lower subalpine habitat types than in drier fire groups. Even stands with relatively heavy fuel loads may not experience fires for many decades or centuries. In the Northern Rocky Mountains fire intervals of 50 to 130 years have been estimated for subalpine fir habitat types. In Central and Southern Rocky Mountain subalpine forests relatively few acres appear to have burned the last 300 to 400 years.

In subalpine forests of the Uintas, the conifer-to-conifer succession has shortened the period of fuel build-up and the interval between fires. The fire interval of Fire Group 10 can be considered to be somewhere between that of PP LTA and AM LTA, say 200-300 years.

c. Fire Severity

The heaviest downed woody fuel loads in Utah forests can be expected in Fire Group 10, particularly on sites where lodgepole pine is seral. Live and standing dead fuels can contribute significantly to overall fire hazard. Dense spruce and fir understory trees along with low-hanging live and dead branches of overstory trees form effective fuel ladders to tree crowns.

However, fine fuels (important for fire spread) are discontinuous and not very abundant. Small diameter fuels appear to change little over time, so accumulation and progression to higher fuel models is slow. Fuels in subalpine stands could be considered hazardous only during extended drought or periods of strong winds. A combination of deep duff and large amounts of dead, rotten fuel can result in hot smoldering surface fires during unusually dry conditions. When a dense understory exists, fire can easily spread to tree crowns and destroy stands. Even if surface fires do not crown, there is a good chance that spruce and subalpine fir trees will be

killed by cambium heating. Roots of shallow-rooted spruce or fir may be killed by duff fires, leaving them susceptible to insects, disease, or windthrow.

FIRE GROUP 5: LIMESTONE HILLS LTA

a. Vegetative Community Description

Forest types in this LTA are found on the cooler, moister sites and are typically a mix of Douglas-fir, aspen, and blue spruce, with lodgepole pine being relatively scarce. Non-forested communities include occasional grassy meadows surrounded by forest and a few large areas of sagebrush.

Due to the variable fire regime described below, a mosaic of fire treatments probably existed across the historical landscape, with much variability within a single fire treatment. Stands were thinned or replaced, and species relationships were altered. Low intensity or thinning fires favored Douglas-fir because mature trees are fairly fire resistant, and the relatively shade tolerant seedlings were able to establish in moderate amounts of residual duff. Stand replacement fires favored seral lodgepole pine or aspen on sites where seeds or suckering roots were available. The success of aspen regeneration depended partly on severity of the fire. High severity burns reduce or eliminate suckering if shallow roots are exposed to lethal heating.

b. Fire Frequency

Fire histories for moist or cool Douglas-fir types in Utah are lacking. Douglas-firs in the Uinta Mountains have multiple fire scars, and stands contain much scattered charcoal, indicating fire occurred at relatively frequent intervals in the past. Large coverages of aspen may indicate the occurrence of severe fires in the past. Native Americans were likely responsible for some of these fires. Studies show a mean fire-free interval of 15 to 30 years for Douglas-fir habitat types in the Northern Rocky Mountains.

c. Fire Severity

Douglas-fir and lodgepole pine dominated forests have variable fire regimes. Topography, weather, stand structure, and fuel loading all contribute to different patterns of fire intensity and frequency in these stands. A range of fire behavior, from light surface to stand replacement, can occur.

Downed as well as standing dead trees may add greatly to fuel loads and corresponding fire hazard. If dense understories are absent, fire hazard is reduced. However, the dense overstory trees and the presence of dead branches near the ground create a crown fire potential under severe burning conditions. Fuel conditions in stands dominated by lodgepole pine or aspen are less hazardous than in those dominated by Douglas-fir. Ladder fuels are less prevalent, and there is less probability of fire moving from the forest floor to the crown.

FIRE GROUP 11: ALPINE MORAINE LTA

a. Vegetative Community Description

The AM LTA provides a nearly continuous subalpine forest. Engelmann spruce dominants at higher elevations (10,400' and above), but at the elevations found in the Trout Slope area (9400' to 10,400') stands are usually a mix of Engelmann spruce and lodgepole pine. Subalpine fir is sometimes present, but very rarely dominates.

Low severity fires that burn away much of the duff may remove shallow rooted species or weaken their roots, thereby raising the water table and possibly increasing the windthrow potential among remaining live trees. Deep-seated resprouting shrubs and herbs, or annual species may dominate post-fire sites. Or, the resulting open canopy and upturned soil can create favorable conditions for conifer regeneration. At high elevations, spruce regeneration may suffer sun scalding if too much overstory is removed. Windthrow and sun scalding may be mitigated if sufficient dead trees remain standing.

b. Fire Frequency

With increasing elevation and associated cooler temperatures, higher humidity, and greater precipitation, frequency and size of fires are decreased even though fuel loads can be quite heavy (portions of the area are in Fuel Model 10 - see next section). Researchers have found intervals of 300 to 400 years between fires in drainage bottoms compared to 300 years for drier upland sites. At the upper elevations of this LTA, fire frequency is probably 300 years or more and size of fire is mostly less than 40 acres. Compared to the other LTAs in the Trout Slope area, both fire frequency and size are low. However, at lower elevations Alpine Moraine areas may respond to fire in ways similar to Trout Slope LTA. Tree stocking and rate of succession in lower elevation forests indicate frequent fires were part of their evolution.

c. Fire Severity

Low severity smoldering fires of restricted area probably occur most often. This type of fire may remove single trees or a small group of trees rather than entire stands. Severe fires are rare in these moist forests but they can invade from adjacent stands during dry, windy weather or in drought periods.

Although fires are relatively rare, they may be more severe because of higher fuel loads resulting from greater site productivity on moist sites. In addition, thin bark and shallow roots make spruce especially susceptible to mortality from hot surface fires that consume organic layers around trees. Thus, stands may be killed by either surface fires or by crown fires that encroach from surrounding stands.

EXISTING FIRE RISK AND FUEL LOADS

Although an average fire return interval can be calculated for any site, the interval between any two fires in an area may only be a few years. Regional fire frequency varies with summer dryness and lightning occurrence. Locally, it depends on slope, aspect, elevation, and natural

fire barriers. Fire size is also weather dependent. Large fires may occur during drought conditions in most lodgepole stands regardless of stand age. The overriding effect of weather was demonstrated in the fires that occurred in Yellowstone Park in 1988. Another variable which is a major determinant of fire risk (and which, unlike weather and topography, is subject to management) is fuel load.

Existing and expected fuel loads and their relationship to fire risk and behavior can be described by fuel models (Anderson 1982). Whereas Fire Groups are defined by variables such as habitat type, elevation, and moisture conditions, and are relatively static, fuel models define a range of site conditions by the available fuel loads. These range from highly flammable (widespread availability of small diameter materials) to fire resistant (scarce and/or discontinuous small fuels).

Currently, fuel loads in the Trout Slope area are best represented by **Fuel Model 8**. This model is defined by total dead and live fuel loadings of five tons per acre for the three-inch and smaller size classes. Slow burning ground fires with low flame lengths, punctuated by occasional flare-ups when the fire encounters a "jackpot" or pocket of heavy fuels, are typical on such sites. Only under severe weather conditions do such fuels pose a significant fire hazard in terms of extent, severity, resistance to control, etc.

However, fuel loads are expected to increase in Trout Slope over the next decade. The beetle epidemic of the 1980s affected some 150,000 acres and killed 20% to 80% of the overstory trees. Within 20 years, most of these trees will have fallen creating high fuel loads and increasing the fire potential. At the same time, establishment of young conifers will provide a fire ladder to the overstory crowns. Given conducive weather conditions, larger fires could be expected to occur as ignitions find a more fire-sustaining fuelbed.

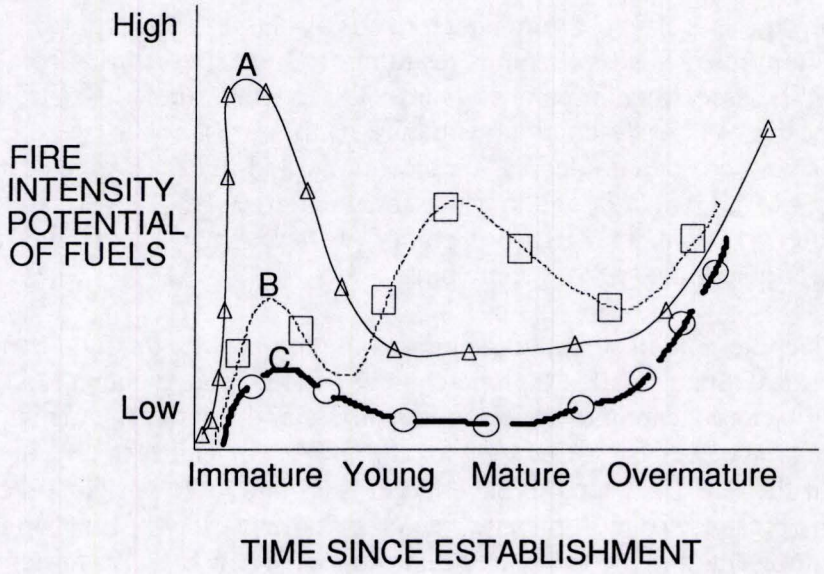
Stands with a largely dead overstory and substantial understory regeneration will eventually attain the level of a **Fuel Model 10**. This model describes sites where the dead and live material smaller than three inches in diameter totals 12 tons/acre, and greater quantities of three-inch or larger deadwood have accumulated as a result of overmaturity or other natural mortality events. Fires in such fuels typically burn in the surface and ground fuels with greater intensity than in other fuel models. Crowning out, spotting, and torching of individual trees are also more frequent in this fuel type, leading to potential fire control difficulties. Fires in these types of fuels burn at the upper limit of our ability to control them by direct attack, and could lead to an escaped fire. In general, fire potential in mature stands within this model will rate from medium to high based on an "average bad" fire weather situation.

Another variable affecting fire risk is stage of stand development. Researchers have related fuel cycles and fire hazard in lodgepole pine to stand age (see graph below). Curve A of this figure corresponds to what has been described as "typical" fire hazard in lodgepole pine. In this scenario, the young, dense stands are most hazardous. Hazard decreases as stands grow into more open immature and mature stands, then begins to increase again as stands become overmature and ground fuels build up from downfall and establishment of shade tolerant species.

Curve C depicts conditions under which ground fuel quantities remain relatively low throughout the life of the stand until it undergoes decadence. In this scenario, fire potential is

very low until late in the life of the stand. Such conditions are not uncommon where density of trees is lower.

Individual stands can vary anywhere between curves A and C during younger growth periods depending on stocking density, but fire risk in the latter stages of stand development will consistently be high. This illustrates the importance of considering site specific conditions, such as productivity, when assessing local fire risk.



Overall fire potential of fuels in the Trout Slope area by LTA is as follows:

LTA	FIRE POTENTIAL
Lower Trout Slope	MEDIUM but trending to High or Extreme*
Upper Trout Slope	LOW to MEDIUM but trending toward Medium-High
Parks Plateau	LOW to MEDIUM
Limestone Hills	LOW to MEDIUM
Alpine Moraine	LOW to MEDIUM

*Trend information is based on typical ages and amount of dead wood or decadence in the overstories of stands, and is specific to the portions of each LTA within the assessment area. Conditions may differ outside this area.

Values at risk in the Trout Slope landscape include the Oaks Park Summer Home area, Trout Creek Guard Station, campgrounds at Oaks Park, East Park, Iron Springs, and Kaler Hollow, several high use dispersed recreation sites, and a microwave site on Grizzly Ridge. Hazardous fuels within and adjacent to these sites are being treated to varying degrees, from hand piling the slash to utilizing timber sales for fuel breaks. Additional values include two summer homes located on Dyer Mountain, cultural resources (e.g. the smelter site located in Anderson Creek), watersheds, habitat for forest dependent wildlife, opportunities for wood product removal, and

visual quality of the landscape.

WILDLIFE HABITATS AND POPULATIONS

TROUT SLOPE , ALPINE MORAINE, AND PARKS PLATEAU LTAs

a. Typical Habitats and Fauna

Landscapes within the TS LTA are characterized by large expanses of forest, broken occasionally by natural meadows or openings resulting from recent disturbance. The portion of the PP LTA within the assessment area is similar to TS; together, they differ from other, lower elevation landscapes in the nearly continuous nature of the forest cover (vs. the progressively patchier nature of forest cover with decreasing elevation), and in the relative scarcity of aspen. The portion of the AM LTA that is within the assessment area (AM1, AM2 and AM3) is also largely forested, but differs in that it has a colder, wetter climate, more wet meadows and potholes, and a lower percentage of lodgepole pine.

The amount of lodgepole pine in a stand is related to the forest structure, and therefore wildlife habitat, that it provides. Stands with a high percentage of lodgepole pine tend to be fairly dense and even-aged, with closed canopies, open understories, and relatively small tree diameters. This stand structure is typical of forests in the PP LTA. In contrast, the higher elevation spruce/fir forests of the AM LTA tend to have larger trees and more varied and complex stand structures due to the presence of multiple age/size classes, the variety of tree forms provided by the various species present, and a clumpy tree distribution. The TS LTA is often made up of a mix of spruce, fir, and lodgepole, and is intermediate in many of these structural features.

Breeding bird surveys in lodgepole, spruce/fir and mixed conifer forests have detected fewer species and fewer individuals/species than in other forest types on the Ashley. This is consistent with the findings of Finch and Ruggiero (1993), whose summary of literature from the Rocky Mountains and northern Great Plains suggested that spruce/fir and lodgepole forests are less rich in vertebrate species than other forest types. The most common birds are juncos, mountain chickadees, pine siskins, ruby crowned kinglets, red crossbills, hermit thrushes, and yellow-rumped warblers. Typical small mammals include red squirrels, flying squirrels, chipmunks, golden-mantled squirrels, deer mice, masked shrews, boreal red-backed voles, and snowshoe hares.

These three LTAs provide summer range for **elk and deer** and year-long range for **moose**. The natural meadows are important foraging areas for big game. And, since the beetle kill of the early 1980s, forage produced under dead forest overstories and in clearcuts created by salvage logging have also received considerable big game use. Riparian corridors are used as calving/fawning habitat and travel lanes as well as resting areas during the hot summer months. Loss of canopy closure and gradual thinning of stands through blowdown following the beetle kill has reduced cover values in many stands. However, the standing dead lodgepole still provide some shade and security by breaking up sight distances.

b. Habitat Values for Species of Special Concern (TES, etc.)

No threatened or endangered species are known or expected to occur in these LTAs. A single **bald eagle** was seen repeatedly near East Park Reservoir one year during early winter, but apparently left the area after the reservoir froze over.

The AM LTA is **amphibian** habitat due to its numerous potholes and perennially wet areas. The high elevation and cold climate of this LTA would preclude many species, but others (such as the spotted frog and boreal toad, both sensitive species here and/or in Colorado) are known to occur at high elevations. Little is known about amphibian communities anywhere on the Ashley, but the AM LTA would be a good place to invest in surveys.

Although not rich in species, lodgepole and spruce/fir forests are more likely to have certain species of interest, especially those associated with late-successional forest structures, than other forest types (Finch and Ruggiero 1993). Examples of such species which are known to be present in the coniferous forests of the Trout Slope area are the pine marten, northern goshawk, and three-toed woodpecker.

The **pine marten** is tentatively identified by the Utah Division of Wildlife Resources as a sensitive species based on its limited distribution in the state. Pine marten are closely associated with mature forest habitats and are sensitive to habitat fragmentation due to clearcutting (Snyder and Bissonette 1987). A recent study conducted in the Uinta Mountains (including sample sites within the assessment area) showed declining marten use with increasing fragmentation until the landscape is about 35% open/65% forest. Marten use dropped to zero when more than 35% of the landscape was open (Hargis and Bissonette 1995).

The **northern goshawk** is a Forest Service sensitive species, an Ashley National Forest management indicator species for old growth forest, and a U.S. Fish and Wildlife Service category II candidate for listing as threatened or endangered. It has been found nesting in a wide variety of forest types on the Ashley but the majority of nests occur in mid-elevation forests, especially mixed conifer. Of 70 nest sites mapped to date, 30 are in the Trout Slope LTA (including 10 within the Trout Slope assessment area). The next most commonly used LTA is PP, with 12 nests. The other 28 nests are spread over a variety of LTAs with no single association having more than five nests.

Goshawk survey effort has been somewhat biased toward lodgepole and mixed conifer sites since that is where the majority of management activity is currently occurring. Therefore, these numbers are not a reliable indicator of preference. However, the Ashley biologists suspect that unbiased, stratified sampling would show the same pattern based on what is known about goshawk habitat preferences. Reynolds et al. (1992) summarized desired forest conditions for goshawks as "...older-aged stands that have a high density of large trees, high tree canopy cover, and high basal areas" for nesting and "...forests with relatively open understories and large trees" for foraging. These features provide nesting cover, are well-suited to the goshawk's hunting methods, and provide good habitat for many prey species. In addition, goshawks usually select nest trees whose crown has lifted and which have a deformity or stout lateral branch in the lower part of the remaining crown to serve as a nest platform.

Stands with a significant lodgepole component are likely to have all these features (see stand structure description in section (a), above). Mixed lodgepole/spruce/fir may be better habitat than pure lodgepole since such stands occur where disturbance intervals are longer and trees are able reach larger sizes. They may also be better than pure spruce/fir stands because spruce/fir occurs at high elevations where snow cover often persists well into the nesting season, tends to have a more cluttered understory due to the presence of multiple age classes of trees, and tends to have trees with many small limbs rather than the stout, well-spaced limbs preferred for nesting and perching. Based on these structural features, mid-elevation mixed conifer forests such as those in the Trout Slope LTA are expected to support more goshawks than other forest types.

The **three-toed woodpecker** is also a Forest Service sensitive species based on low population densities region-wide and susceptibility to habitat alteration by logging. It appears to be relatively common in the Uinta Mountains, and has been seen throughout these LTAs. This woodpecker is dependent on snags for foraging and nesting habitat. It especially needs snags in the early stages of decay since it feeds on insects found under the bark. The current population size may be related to the recent pine beetle epidemic which created very high snag densities in the eastern Uintas.

Populations of the **Brownie ladyslipper** (Cypripedium fasciculatum) occur in the vicinity of East Park. This plant occurs in the understory of lodgepole pine and mixed conifer forests (especially pole-sized lodgepole stands where few other plants occur in the duff). It is possible that other populations exist in the assessment area, and management recommendations are to continue monitoring of larger populations and to search/inventory suitable habitats for additional populations.

Other sensitive species which may now occur and/or occurred historically in the these three LTAs are lynx, wolverine, great gray owl and boreal owl.

Much of the assessment area is suitable **lynx and wolverine** habitat and is known to support some of the favored prey species (such as snowshoe hare for the lynx). Based on a review of historical UDWR and USFS records, McKay (1991a, 1991b) lists two probable lynx and two possible wolverine sightings within the assessment area. The most recent is a 1982 probable lynx sighting. Track surveys conducted along the Trout Creek to Hacking Lake road by both UDWR and USFS, plus a variety of other track transects run in the assessment area over the past five years, have not detected either lynx or wolverine. The developed character and current high degree of forest fragmentation make it unlikely that either is present now. In fact, it is doubtful that populations currently exist anywhere in the Uintas (McKay 1991a, 1991b).

A single auditory location of a **boreal owl** was heard in the TS LTA just north of East Park Reservoir in 1993. Two more boreal owls and two **great gray owls** were heard in mixed conifer habitat along the Chepeta Lake road (AM LTA, outside the assessment area) in 1996. Great gray owls are considered "casual" (seldom occurring; not reported annually) in Utah (Behle et al. 1985). The only other record for this species in the Uintas comes from the north slope near Spirit Lake, and dates back to 1962 (Behle 1981). There are no historical records of boreal owls existing in Utah (Behle et al. 1985), although their presence in both Idaho and Colorado suggests the existence of a Utah population.

Great gray owls use a variety of forest types, including Engelmann spruce and mixed spruce/lodgepole. They are usually found in relatively moist forests in the vicinity of marshes, lakes, wet meadows or other open habitats (Duncan and Hayward 1994). Boreal owls are known to use forests with a lodgepole component, but are more often associated with high elevation spruce/fir systems. Habitat quality is thought to decline when lodgepole comprises 20% or more of the forest overstory (Hayward 1995). The best potential habitat for both species in the assessment area is in the AM LTA where spruce and fir are dominant, and habitat conditions are generally wetter than in the other LTAs. The TS LTA is also possible habitat, especially along riparian corridors, adjacent to wet meadows, and/or at higher elevations (where a substantial spruce component is present). Both species are unlikely to occur in the PP LTA.

Colorado River cutthroat trout probably occurred in many stream reaches in the assessment area at one time. Currently, the major streams and reservoirs are stocked with non-native trout for sport-fishing purposes. No native cutthroat populations are known or expected to be present. Native cutthroat are vulnerable to angling and hybridize easily with non-native trout, so the high levels of recreation use in the assessment area are probably incompatible with a reintroduction of this species.

Other sensitive species listed for the Ashley may occasionally occur in these LTAs but are not expected there with any regularity or in significant numbers due to different habitat preferences.

c. Landscape-Level Habitat Trends and Wildlife Management Issues

Three habitat factors that have great potential to change the distribution and abundance of wildlife in these LTAs are roads, snag densities, and forest fragmentation. Currently, all three are at quite high levels. As dead trees fall or are harvested, snag densities will go down and fragmentation will increase. Trends in road densities may be either up or down depending on management priorities (for existing road densities, see Appendix 6). Some of the effects of these habitat factors on wildlife are as follows.

The physical presence of roads, so long as they are designed to avoid impacts to riparian areas or direct loss of a nest site, has little effect on wildlife. However, the subsequent traffic and disturbance does have the potential to change habitat values, especially for big game. There are many studies indicating that elk avoid roads that are open to traffic. The extent of the avoidance varies with the amount of traffic, season(s) the road is open, and quality of cover adjacent to the road (Leege 1984). In general, we can expect elk use to be reduced within 1/2 mile of roads (Thomas et al. 1979, Hillis et al. 1991). Habitats within this zone should not be considered as available to big game or counted toward habitat objectives such as desired forage/cover ratios.

The relationship between road densities and hunter success is of particular concern in management of big game populations in the assessment area since it is very heavily hunted. The Division of Wildlife Resources has identified roads as a habitat concern and access management as an important tool in reaching hunt quality objectives (defined in terms of mature bucks and bulls) for local deer and elk herds.

There is also a minimum patch size requirement for big game cover areas. Thomas et al. (1979) put the optimum patch size at 30-60 acres (with a width of at least 600' but no more than 1200') based on interior stand conditions and typical elk behavior. However, Hillis et al. (1991) recommended a minimum of 250 acres when vulnerability to hunters was a management concern, or even larger patches if habitat conditions are unfavorable (e.g., high fragmentation or easy hunter access). In the Trout Slope assessment area, desired patch size would vary in relation to distance from open roads, but at a minimum forested areas less than 600' wide or 60 acres in size should not be considered big game cover. Where hunting pressure is high, it would be advisable to manage for patches $\geq$ 250 acres in size.

The larger patch size has other advantages as well. Forest wildlife communities will tend to have a greater variety of species and larger populations per species with increasing size of forest patches. This means the communities will be more diverse and populations of individual species will be more viable (have a better chance of persisting over long periods of time) than they would be in small patches. (For a review of these species/area relationships, see Harris 1984, Morrison et al. 1992, and Primack 1993.)

One of the reasons large forest patches have richer wildlife communities is that they are the only ones that will support species with large minimum patch size requirements. While a species that can use a small patch will also use a large one, the reverse is not true. Regardless of the total acres of forest habitat available, if none of that habitat occurs in large patches certain species of forest wildlife will be absent from the landscape. Marten are a good example of a species which needs large patches. Hargis and Bissonette (1995) recommended providing forest patches 2-3 sq miles in size and an overall percentage of openings in the landscape of no more than 20% to maintain marten populations. Although the total area needed varies, this pattern of largely forested areas mixed with small (0.75 to 4 ac) openings has also been recommended for some other forest species (including goshawks and boreal owls).

Finally, large patches (at least, those with blocky rather than linear shapes) have a high interior/edge habitat ratio. Edge habitats tend to attract species from both habitat types forming the edge; e.g. from clearcuts and forests. However, habitat conditions in the edge zone are usually a compromise between the adjacent habitats. Morrison et al. (1992) noted that "forest fragments are subject to drying and invasion by early successional plant species along edges and at large openings." Therefore, edges tend to be occupied by ecological generalists (species that can successfully utilize a variety of habitats) rather than specialists (species that have adaptations or life history strategies which are specifically linked to a particular habitat type). True forest-dwelling species seem to avoid edges, either because of unsuitable conditions or increased predation risk or competition, or a combination of all these factors.

Edge effects generally extend 2-3 tree lengths into the stand (Harris 1984, Morrison et al. 1992), and are most pronounced where edge contrast is high (e.g., a clearcut next to a mature stand). To provide any interior forest habitat at all, then, a forest patch must be **more than** 6 tree lengths wide (i.e., more than about 330', based on a typical 10-12" dbh lodgepole pine in the assessment area). Thomas et al. (1979) recommended a minimum width of 600' for big game, and Hargis (1995) recommended 650' based on marten habitat use patterns.

Many of our existing buffer strips were designed to hide an elk from view - specifically, to provide a visual barrier equivalent to one 200' sight distance as defined by Thomas et al.

(1979). Such buffers do break up sight distances, but aren't big enough to provide resting/hiding cover for big game or interior forest habitat for species like pine marten or redbacked voles. They should not be included in calculations of available habitat for those purposes. Figure 3a shows where small buffer strips presently occur in the assessment area.

Managing for a variety of patch sizes, using marten to represent the maximum and big game for the minimum, should cover the spectrum of forest wildlife habitat needs. An example would be a landscape that intersperses patches of 200-300 acres as stepping stones to facilitate travel between 1200-1900 acre patches. In the Trout Slope landscape, large patches are needed to act as reservoirs of diversity while adjacent areas recover from the effects of the mountain pine beetle epidemic and subsequent loss of mature forest cover. This is especially true since large blocks of forest are currently rare over much of the Trout Slope area and will get rarer still as the dead trees fall or are removed. Franklin and Forman (1987) described the need to identify and maintain large patches of forest, with corridors between the patches, as "urgent" because of rapidity with which current harvest practices are reducing patch size. Where large patches still exist in the TS, PP and AM LTAs, they should be maintained as long as possible in order to sustain the full range of species expected in these predominantly forested landscapes.

The third factor affecting wildlife communities in the assessment area right now is snags. Tree mortality can have a positive effect on biodiversity at the stand level. Stone (1995) found birds, small mammals and insects to be more diverse and abundant in lodgepole stands with moderate (51-75%) tree mortality than at greater or lesser mortalities; big game use increased linearly with tree mortality. These diversity/tree mortality relationships were correlated to increases in understory biomass and structural diversity. However, this increase in diversity may come at the expense of some forest specialists. Hargis and Bissonette (1995) found a negative correlation between marten use and snag density. Therefore, where overstories in the Trout Slope area are all or nearly all dead, they may have little value as reserve patches for these specialists.

Snag habitat is currently superabundant, which may explain why three toed woodpeckers are relatively common. As these snags age and lose their bark and limbs, they will also lose utility for some species of wildlife (such as foraging woodpeckers and bats which roost under loose strips of bark). Those with cavities will continue to be an important resource for secondary cavity nesters, but in general we will lose some of the habitat values associated with snags as they age. Eventually snag numbers will decrease due to harvest, windthrow and so on. Although this is far from an immediate problem, we will need to pay closer attention to the quality and quantity of snags available, and perhaps begin managing to create appropriate numbers of new snags, as time goes on.

LIMESTONE HILLS LTA

a. Typical Habitats and Fauna

This LTA contains a range of habitats from sagebrush/grass flats to Douglas-fir, blue spruce, and/or aspen forests. Aspen and Douglas-fir forests are intermediate in species richness and total numbers of **breeding birds**, among the eight forested habitats sampled on the Ashley. They outrank lodgepole, spruce/fir and mixed conifer forests, but are somewhat less rich in

birds than ponderosa pine and riparian canyon habitats. They are roughly equivalent to pinyon/juniper in total numbers of species and individuals.

Blue grouse and ruffed grouse are found in Douglas-fir stands, and **sage grouse** are possible in the sagebrush flats in the southern part of this LTA. However, sage grouse are not known to use these areas at present. All known leks and use areas are further south on certain Parks Plateau landtypes which are out of the assessment area.

Big game use the aspen stands of the LH LTA during calving and fawning. It is also considered to be an important fall use area since it is the lowest elevation LTA with extensive forested areas for hiding cover.

b. Species of Special Concern (TES, etc.)

No threatened or endangered species are known or expected to occur in this LTA.

Sensitive species associated with LH habitats are flammulated owl, spotted bat, Townsend's big-eared bat, northern goshawk, great gray owl and three-toed woodpecker.

Flammulated owls are closely associated with interior montane ponderosa pine and Douglas-fir forests (McCallum 1994). They have been located in both of these forest types on the Ashley, including several individuals in the Iron Springs area. Based on their habitat preferences, and lack of survey success in other forest types on the Ashley, flammulated owls are probably restricted to the LH and SC (stream canyon) LTAs on the Vernal District (since these are the only LTAs with significant amounts of either ponderosa or Douglas-fir).

Spotted and Townsend's big-eared bats are considered possible residents of the LH LTA because of the presence of limestone outcrops which provide potential roost sites. Roosts are thought to be limiting for both species. No surveys have been done to determine presence or absence of these species in the assessment area. Both spotted and Townsend's big-eared bats have been located elsewhere on the Forest (Lengas 1994; USFS survey data) which improves the chances of suitable but unsurveyed habitat being occupied.

One goshawk nest has been located in this LTA in a mixed Douglas-fir/aspen stand. Stands with either or both of these tree species are suitable. Blue spruce stands are believed to be less suitable due to their different structure (see discussion under TS, PP and AM LTAs, above).

Although more typical of moist coniferous forests, **great gray owls** have been described as using "relatively xeric, montane evergreen, or deciduous forests up to 2800 m elevation" in the southern part of their range (Duncan and Hayward 1994). Most of the forested areas in the LH LTA fit this description, and are therefore potential habitat. No great gray owl surveys have been done in this LTA.

Three-toed woodpeckers have also been found in Douglas-fir forests on the Ashley. There are fewer locations in Douglas-fir than in lodgepole or spruce/fir, however surveys have not been stratified by habitat and may not be indicative of habitat preferences. Three-toed woodpeckers are generally associated with conifer and mixed conifer/hardwood stands (Spahr

et al. 1991), and are not expected to occur in aspen.

c. Habitat Trends and Landscape-Level Management Issues

Much of the aspen in this LTA shows a high degree of decadence. Treatments designed to stimulate suckering and new stand development have had mixed success - some resulted in prolific response, others in no response. This is an important habitat component for big game and for many nongame species because of its high diversity and productivity. To maintain aspen as a habitat type, it will be necessary to develop a treatment plan of some sort to get new, vigorous stands started. This will require a better understanding of the role of natural disturbance, and of fire in particular, than we now have for this LTA.

STREAM CANYON LTA

This LTA comprises a very small percentage of the Trout Slope assessment area. Detailed discussion of the habitats and wildlife communities it supports will be provided in another assessment (the South Face assessment scheduled for 1997). Notable features include the presence of cliffs which provide nesting habitat for some raptors and roost sites for the bats discussed above. Where ponderosa and/or Douglas-fir are present, flammulated owls are possible. Surveys have located this species in SC landtypes in Dry Fork Canyon and Ashley Gorge, well south of the Trout Slope assessment area.

WATERSHED AND SOILS

DRAINAGE DESCRIPTIONS

The Trout Slope landscape is located primarily in the upper part of two drainages, Brush Creek and Ashley Creek. Both watersheds have been subdivided into smaller areas known as subwatersheds, which basically contain a primary tributary and its associated drainage area (see map in Appendix 5). The elevation within these drainages ranges from about 12,000 feet in the northwest part of Ashley Creek drainage to about 8,000 feet in the southeast on Little Brush Creek. The portion of the these drainages that is within the assessment area ranges from about 10,500' in the northwest to about 8,200' in the southeast. The broad, low to moderate gradient drainages of the Trout Slope area drain into steep, narrow canyons.

WATER FEATURES

The main streams of the Ashley Creek drainage are North Fork Ashley Creek, South Fork Ashley Creek, Center Creek, and Trout Creek. Hacking Lake, Lily Pad Lake, and Long Park Reservoir are the larger bodies of water. About 12 large meadows, some with extensive wetlands, occur in the drainage. A canal transports water to the North Fork of Ashley Creek about 0.8 miles east of Hacking Lake. Two large areas of ponds (potholes) occur south of the North Fork Ashley Creek in the western part of the study area. These ponds were formed by

glaciers that once occupied the area.

The main streams of the Brush Creek drainage are Big Brush Creek, Government Creek, Anderson Creek, and Little Brush Creek. No natural lakes occur but two man-made reservoirs, Oaks Park and East Park are in this drainage. About 10 large meadows occur in the drainage, and as with the Ashley Creek parks, extensive wetlands occur in some of the meadows.

UPLAND CONDITIONS

Most of the upland areas have ground cover $\geq$ 85% of potential and healthy vegetation. Areas underlain with Red Pine shale in the TS1 landtype and with fractured bedrock near the surface in the Limestone Hills LTA have inherently poor soil productivity and lower ground cover potential.

Affecting the upland watershed are roads, timber harvest, ungulate grazing, hiking and ATV trails, other recreational activities and sites, and occasional fires. These can alter, displace, or compact the soil surface or ground cover, leaving soil open to erosion or leading to conditions unconducive to normal plant growth and establishment.

RIPARIAN AND STREAM CONDITIONS

Stream surveys have been conducted on most of the main streams. These surveys indicate that the overall stream channel condition is good for most of the stream reaches within the Trout Slope analysis area. Moderate to high gradient stream reaches are common to most of the analysis area, The stream channels are predominantly well armored and vegetated, which provides stability against scouring and stream bank erosion.

Some streams are experiencing stream bank deterioration. These areas are confined to low to moderate gradient meadow and flat-bottomed valley areas of fine-grained soil influence. Stream banks are more susceptible to trampling and and sloughing in this setting and become particularly vulnerable with the removal of vegetation or where shallow-rooted vegetation becomes the dominant stream side cover. Deteriorated conditions exist along small segments of Little Brush Creek near Round Park, the West Fork of Little Brush Creek, the North Fork of Ashley Creek, and Anderson Creek. The localized nature of stream bank instability suggests more of a direct on-site influence of activities than a cumulative effect of increased flows from upstream timber harvesting. Most of the trampling and sloughing of the stream banks can be attributed to causes such as cattle grazing, stream crossing and drainage problems associated with road alignment, and breached beaver dams.

Another on-site factor affecting stream conditions is the presence of large woody debris within the channel, which can cause water to eddy and erode stream banks. Most of the stream reaches in the area have an assortment of woody debris in the channels, causing some bank erosion, but also providing some benefits to fish through increased cover and cooler water temperatures.

Floodplains play an important role in maintaining fisheries habitat and the stability of streams and riparian zones. Floodplains dissipate stream energy during peak flows, provide nutrients, capture sediments, deposit seeds, and provide wildlife habitat (Platts 1990). Broad floodplains occur in low gradient, highly meandering sections of streams mainly in meadows and flat-bottomed valleys. The conditions of floodplains in the Trout Slope landscape are generally good. Some areas are being affected by roads and stream habitat improvement structures placed within the floodplain area, but the effects are confined to the immediate area.

There are two primary off-site factors which could have a cumulative influence on stream channel condition in the Trout Slope area: delivered sediment and increased water yield. Delivered sediment is limited by long delivery distances from an activity to a perennial stream reach, moderate slope gradients, and numerous reservoirs in the area acting as catchment basins. Based on these conditions, it is assumed that the cumulative effects of delivered sediment from up slope activities is proportionally less than potential in-stream sources from bank cutting as a result of increased flows.

Increased water yield could possibly result in the adjustment of the stream channel over time. Most of the impacts occur during peak flows which are affected by geology, land type characteristics, tree mortality, and especially management activities. In many reaches within the Trout Slope area, large substrate material will limit stream bed scour and any adjustment is likely to occur as lateral movement. This lateral movement results in stream bank cutting, which could introduce a large amount of sediment. The Ashley's management intent is to limit activities, and their associated potential for increases in magnitude and duration of peak flows, to levels which will not result in broad scale channel adjustments. The application of the Equivalent Clearcut Area (ECA) methodology and the associated Ashley National Forest Plan standards and guidelines are designed to maintain watershed conditions and meet water quality objectives (see Appendix 5).

HUMAN USES

RECREATION FACILITIES AND PATTERNS OF USE

The Trout Slope area is very popular for hunting, wildlife viewing, fishing, camping, firewood gathering, hiking, horseback riding, cross-country skiing, driving for pleasure (truck, car, motorcycle, ATV, snowmobile, mountain bike), and other leisure time pursuits. Most recreationists are Ashley Valley residents. Demand for recreation in Trout Slope is expected to increase as population increases. Most recreation pursuits are not tied to a specific LTA as much as they are related to presence of facilities for use (campgrounds, trails, roads) or unique environmental features (water bodies, meadows, views, wildlife, isolation, etc.). See Appendix 3C for locations of facilities and high dispersed use areas.

a. Trails

Snowmobile and ATV trails connect this area with the Flaming Gorge National Recreation Area and other areas of the Vernal Ranger District to the south, east, and west. Backpacking, horseback riding, and mountain biking are growing in popularity, with the Highline Trail #025 becoming a popular attraction. This old, historic trail that runs along the crest of the Uinta

Mountains is being reclaimed by way of a State of Utah/Forest Service Cost Share Agreement. Other trails in the area include: Lake Park #028, Oaks Park-East Park #070, Leona Spring-Manila Park #009, Trout Creek #029, Pat Carol Park #031, Ashley Driveway #026, North Fork Ashley #110, Cow Canyon #036, Frenches Park #035, South Fork Ashley #039, Galloway Spring #106. Most of these trails need some maintenance such as clearing and rock removal. The Vernal District Travel Map displays the type of travel allowed on each trail.

Of 228 miles of maintained trails on the district, 59 miles are in Trout Slope. There are no travel restrictions to hiking, horseback riding, or mountain bikes.

Of 45 miles of signed and designated ATV trails on the district, 12 miles are in Trout Slope. About 34,880 acres of Trout Slope are open to cross-country ATV travel. While the Trout Slope area provides both signed ATV trails and cross-country ATV travel areas, certain areas outside Trout Slope are becoming more popular for campers with ATVs. After the beetle outbreak, many people turned to aspen areas for camping and OHV riding (e.g. the Range Study Area and Diamond Mountain).

Of 47 miles of groomed snowmobile trails on the district, 39 miles are in the Trout Slope area. Many ungroomed trails exist as well.

b. Camping

Dispersed camping occurs throughout the area and is very popular. Camps remaining beyond the 16 day limit is an administrative problem.

Developed campgrounds exist at Iron Springs, East Park, Oaks Park, and Kaler Hollow. All have drinking water sources (except Kaler Hollow) and restrooms. At this time no plans exist for expanding these four campgrounds or developing new sites. Iron Springs and its associated group camping area is very popular for picnicking and camping in the developed area south of the Red Cloud Loop Road as well as in the undeveloped area north of the road.

In addition to the campgrounds, Trout Creek Guard Station is rented to the public yearlong, and the Grizzly Ridge Yurt is rented to cross-country skiers during the ski season and mountain bikers during the summer season.

Of the eight developed campgrounds on the district, four are in or near the Trout Slope area and account for 38% of the total RVDs at developed sites.

Of 30 primary dispersed sites on the district, 12 are in or near the Trout Slope area. Trout Slope offers wide, expansive meadow edge camping opportunities as well as secluded campsites under the pines.

c. Travel and Use Monitoring

Since 1982, the Vernal Ranger District has monitored use trends and vehicle impacts in key areas. The findings from monitoring are used or will be used to regularly revise the District Travel Map (last revision 1994), Developed Recreation Site Management Plan, and Dispersed

Recreation Site Management Plan. See monitoring reports for information on site-specific conditions over time, corrective measures taken, and results.

SPECIAL USES AND MINERALS

a. Special Uses (Appendix 3D)

At Oaks Park, 12 summer homes are authorized by recreation residence permits. Oaks Park Reservoir itself is on permit for irrigation uses; a canal and pipeline transmit the irrigation water. East Park Reservoir is on permit as a fishery and for irrigation uses. A permitted diversion and pipeline transmit irrigation water to the Ashley Valley. Long Park Reservoir, Deep Creek Canal, and the Highline Canal are also on permits for irrigation.

b. Minerals

While prospecting is active at times in the Trout Slope area, there are no "working mines". Four private land inholdings around Dyer Ridge were created many years ago when the old Dyer Mine claims were patented.

RANGE / LIVESTOCK GRAZING

a. Forage Availability by LTA (see Appendix 3F)

ALPINE MORAINE LTA: Most of the AM LTA provides little forage for livestock. The area near the potholes is classified as secondary or non-range for livestock because of dense timber and numerous, scattered wet areas. However, this area is important as summer and early fall range for elk. Other timbered areas in the LTA produce too little forage to be of much value to livestock. Where the few meadow communities do exist that are suitable for grazing, they are most important for sheep and cattle grazing, and forage production is good.

TROUT SLOPE LTA: Much of TS LTA is dominated by forest where forage production is low. Such areas have been considered non-range and have not been included in carrying capacity for livestock. In recent years, forage production has increased in the forested areas due to the beetle kill and timber harvest. This transitory range can be expected to benefit livestock and big game for about 40-50 years. Numerous meadows or "parks" which are dominated by graminoid species have been the basis for permitted numbers of livestock in the past. Other important community types include aspen and open conifer sites with grass understories. The conifer/bluejoint community is largely avoided by livestock.

Where the Carter Military Trail and an old sheep trail occur in the LTA there is evidence of poor soil and vegetation conditions. There has only been a little trailing on the area since the 1960s, and livestock use has been moderate or light for many years. Many meadows now appear to be near potential. The wetter and boggy areas have been relatively unchanged by grazing and trailing.

PARKS PLATEAU LTA: Substantial forage as transitory range has been produced following fire or harvest. Traditionally, permitted livestock numbers have not been based on this transitory range, but extensions of grazing seasons have occurred when forage species have increased following reduction of tree competition. Increased forage is high in the first 10-20 years following disturbance, and the transitory forage increase has persisted at some level for 40 years. The longevity of increased forage is often extended by thinning of saplings as a timber stand improvement practice. Without timber harvest or fire, suitable range areas are difficult for livestock to reach due to dense stands of lodgepole pine. Very little forage grows where timber stands are dense. Some suitable range is found under aspen and open timber stands.

LIMESTONE HILLS LTA: Plant communities classified as suitable range for livestock are mountain brush and sagebrush with grass communities (the best forage producing sites), aspen/snowberry, lodgepole pine/elk sedge (areas with closed canopies of conifers have been classified as non-range), and the sagebrush/bluebunch wheatgrass communities. Generally, range within these landtypes is accessible to livestock and could be grazed, but many areas are too steep and rocky.

STREAM CANYON LTA: A large part of this LTA is not suited for livestock grazing due to steep slopes.

b. Grazing Allotments in the Trout Slope area (see Appendix 2 for descriptions)

TIMBER MANAGEMENT

The Trout Slope area has been one of the most important areas for timber management on the forest. The predominant timber type, slope, soil and climate conditions, disturbance patterns, access, and regeneration potential all contribute to relatively abundant opportunities for timber harvest. The Forest Plan recognizes these opportunities in its Management Area prescriptions.

The following table shows the cover type for stands in the assessment area for which we have exam data. Currently we do not have stand exam data for about half (52%) of the stands in the area.

COVER TYPE	*PERCENT OF STANDS*
Aspen	<1
Douglas fir	<1
Engelmann spruce	3
Lodgepole pine	33
Spruce/fir	11
Unknown	52

A high percentage of the lodgepole pine stands are 70-90% dead due to the beetle epidemic in the 1980s.

Figures 3 and 4 illustrate the existing condition of the Trout Slope area by vegetative structural stage (VSS). See Appendix 4 for descriptions of VSS classes.

The following table categorizes the acreage in the Trout Slope area by the predominant strategies employed for timber management (as of this writing). Remember, these are reflective of the existing condition of timber management and do not necessarily portray future harvest scenarios or a desired mix of methods/acres.

COVER TYPE	*ACREAGE*	*PERCENT OF TOTAL*
Sawtimber	57,772	59
Clearcuts	11,612	12
Non-forested	11,089	11
Poles	8,661	9
Aspen	3,714	4
Selective cuts	2,951	3
Doghair lodgepole	537	<1
Private land	403	<1
Water	366	<1
Totals	97,105*	100

*These acreage figures were derived from the RIMRIS database which has not yet been merged with the GIS database. The GIS database was used to derive Trout Slope acreage figures found in other parts of this document. Therefore, some discrepancies between the acreage figures will be apparent.

The acreage in clearcuts is classified as a combination of VSS 1 and 2. The acreage harvested with selective cuts is classified as VSS 3 or 4, depending on the residual stand. The acreage in poles (any species 5" to 9" dbh) is classified as VSS 3. The acreage in sawtimber (above 9" dbh) is classified as VSS 4, 5, or 6, depending on the basal area and stand cover type.

Clearcuts are most prevalent along the northern one third of the assessment area (Trout Slope LTA). Clearcutting has traditionally been considered the optimum harvest practice in stands of pure lodgepole because of its ability to enhance the potential for regeneration of lodgepole stands. Rationale for using clearcutting has also included (depending on site specific conditions): reducing the risk of catastrophic fire, salvaging the economic value of dead and dying trees, and promoting the return of live/green stands to the area for wildlife, recreation, and water quality benefits.

The clearcuts in this area average 22 acres in size and range from one to 27 years old. Clearcutting was conducted within the following constraints: a 40 acre maximum, leave strips large enough for a future harvest unit and suitable for wildlife hiding cover, achievement or maintenance of visual and water yield objectives, and occurring in areas with slopes less than

40% (suitable for tractor logging). The harvest unit shape was determined by current Forest Service direction for visuals, hydrology, and silvicultural practices. As a result we have patch sizes ranging from 1 to 40 acres in squares, strips, and irregular shapes.

Regeneration in clearcuts is primarily lodgepole pine with subalpine fir and aspen as pioneer species. Clearcuts are considered stocked when there are at least 150 trees per acre distributed over at least 70 percent of the harvested stand. In about 10 to 20 percent of the previously harvested stands (old clearcuts), damage to seedlings and saplings from animal browsing, primarily -- but not exclusively -- elk, is at a level to be of concern to timber managers. Heavy browsing, or browsing that has been repeated over two or more years has significantly stunted the growth of the lodgepole in these areas to the point that they appear more like bushes than they do trees. This has obvious implications in terms of the stands' potential to produce sawtimber in the future. The progression of these stands through their vegetative structural stages is affected as well. When many trees are sought as browse for several years, the progression of the stands into later seral stages (and VSS classes) is delayed (see 1995 study, D.Wilson).

PARKS PLATEAU LTA

The Parks Plateau LTA contains stands of predominately lodgepole pine with extensive mortality from the beetle epidemic. As an associated species, aspen is the first to appear in disturbed areas of the LTA, followed by a return of lodgepole pine.

COVER TYPE	*ACREAGE*	*PERCENT OF TOTAL*
Poles	1,960	40
Sawtimber	1,725	35
Clearcuts	770	16
Selective cuts	268	5
Doghair lodgepole	87	2
Administrative sites	43	2
Aspen	36	2
Non-forested	28	2

LIMESTONE HILLS LTA

The timber component of the Limestone Hills LTA consists mostly of Douglas fir, aspen, and blue spruce (be sure to reference LTA descriptions in other parts of this document for additional information). Around Iron Springs, blue spruce is the dominant tree type with understory of common juniper. The effects of the mountain pine beetle epidemic are not as evident in this LTA because lodgepole pine is relatively scarce. Aspen stands are old and have little regeneration. Aspen stands usually have more lush and diverse understories than conifer.

Much of the timber in this LTA which would otherwise be suitable for harvest (blue spruce and Douglas fir) exist on slopes in excess of 40 percent. The plentiful stands of aspen average 58

years old and contain a lot of cull or rotten trees with little regeneration. Therefore, there has not been harvest activity in this LTA.

COVER TYPE	*ACREAGE*	*PERCENT OF TOTAL*
Non-forested	7,348	49
Sawtimber	5,115	33
Aspen	2,555	16
Poles	162	1
Harvested areas	101	1

ALPINE MORAINE LTA

The Alpine Moraine LTA is characterized by mixed stands of lodgepole pine, Engelmann spruce, and subalpine fir.

COVER TYPE	*ACREAGE*	*PERCENT OF TOTAL*
Sawtimber	8,064	66
Clearcuts	1,506	13
Poles	1,385	12
Doghair lodgepole	450	4
Selective cuts	380	3
Non-forested	138	2
Water	13	<1

TROUT SLOPE LTA

The Trout Slope LTA is characterized by mixed conifer forest of mostly lodgepole pine at the lower elevations to increasing amounts of Engelmann spruce as elevation and moisture increases.

COVER TYPE	*ACREAGE*	*PERCENT OF TOTAL*
Sawtimber	38,997	59
Clearcuts	9,336	14
Poles	5,154	8
Sawtimber/poles	3,871	6
Non-forested	3,575	5
Selective cuts	2,303	3
Aspen	1,123	2
Overstory removal	357	1
Water	353	1
Private land	403	1

CHAPTER 2

DESIRED CONDITION

OVERVIEW

WHAT THE PUBLIC TOLD US

People currently pursue a variety of activities in the Trout Slope area ranging from ATV travel, use of developed campground facilities and sport hunting/fishing to nonmotorized travel, camping in primitive, undeveloped areas, and wildlife viewing. The opportunity to graze livestock and harvest personal use firewood and commercial wood products is also very important to local residents.

There were a few concerns expressed over timber management practices. The current high levels of beetle-killed trees have created an obvious management problem, and most people understood and supported some level of salvage harvest. While comments were evenly split over whether to increase or decrease the amount being harvested, there was consensus that any level of harvest needed to be sensitive to the needs of wildlife, effects on recreation and scenic qualities of the area, and effects on water quality and water yield. A number of people suggested that we look at alternatives to clearcutting as a way to reduce both visual and resource impacts. There were also several people who were concerned over the way we were managing fire in the area in terms of both current wildfire risk and the ecological role of fire in the forest community.

In general, though, people seem to want all the current uses to continue as long as the Forest Service is able to keep them more or less in balance and the resources (water, wildlife, scenery, etc.) are not being damaged. Furthermore, most people seem to think that current levels of uses and opportunities are about right. A few people recommended increases or decreases in certain activities or pointed to needs for specific kinds of opportunities (such as turnouts or handicapped-accessible dispersed camp sites), but most respondents said they liked things the way they are. The theme seemed to be "keep all these opportunities available, with the fewest possible restrictions, and without letting the area's natural resources be degraded."

HUMAN EXPECTATIONS vs. LAND CAPABILITIES

This direction from forest users - to maintain the current array of uses in the Trout Slope area - presents two challenges. The first is social: as the human population grows, there will be more and more people camping, hunting, using lumber, cutting firewood and so on. We can manage to provide the same kinds of activities available now in the Trout Slope area, but we cannot manage for the same levels of use. We have to plan for increasing use over time.

The second challenge is ecological. Lodgepole pine is not a self-sustaining system in the sense of being a steady-state, or stable, forest. The normal cycle of events in a lodgepole forest is for

large areas to grow to maturity at about the same time, resulting in extensive tracts of even-aged, homogeneous forest. Mature trees are the ones most susceptible to insects, so a mountain pine beetle outbreak soon follows and turns the landscape grey with dead trees (as much of the Trout Slope landscape is right now). Fire then sweeps through and cleans out these dead forests, creating the open, sunny conditions needed for lodgepole seedlings to get started; and the cycle begins again. Where lodgepole is mixed with spruce and fir, this cycle will occur in smaller patches, over generally longer intervals, than where lodgepole is dominant; but it will happen to some extent throughout the Trout Slope area. This is not conducive to providing a stable flow of wood products, recreation opportunities, or wildlife habitat. Therefore, an unmanaged, "natural" forest would not meet the desired condition identified through public sensing and technical assessment.

Meeting these challenges will require a long-range management strategy that strikes a balance between our expectations and capability of the Trout Slope landscape to meet those expectations. We do not want to eliminate natural processes, such as insects and fire. They are necessary to the long term health and productivity of the forest community. Nor can we entirely avoid regulating human uses, when such uses have the potential to increase beyond the capacity of the land to support them. We can, however, work out a practical compromise that allows for continuous cycling of forested areas from seedlings through maturity and back to seedlings, providing a relatively predictable supply of both wildlife habitat and wood products that is flexible enough to accommodate a variety of management priorities in special areas, such as campgrounds or popular dispersed recreation sites.

A SUSTAINED YIELD APPROACH TO FOREST MANAGEMENT

Timber management for a sustained yield of wood products is a familiar concept for most forest managers. The idea is simple: harvest only as many trees as the land is capable of replacing in a given time period. This will ensure a steady flow of products without depleting the timber resource. The same approach can be used to describe sustainable levels of many other things people want from National Forest lands, such as wildlife habitat or livestock forage.

Acres of forest available for various uses under such a model can be calculated, based on the growth rates of existing forest types and the desired rotation length (i.e., the maximum stand age we choose to manage for). A detailed description of the assumptions and calculations used to define a sustained yield model for the lodgepole and mixed conifer forests of the Trout Slope area is provided in Appendix 4. Features of the resulting model which will help meet our desired condition of a more stable forest system, capable of supporting all the human uses which are now occurring, are summarized below.

The model required that we define a management rotation length for the forest types present. Each forest type will have a typical maximum stand age, based on the average interval between stand-replacing events (insects, disease, or fire). We were able to estimate inherent maximums for Trout Slope area forests from the fire groups and LTAs described in Chapter 1.

Forests in Fire Group 8 have a fire return interval of from 50-200 years. This is pretty wide range, so we subdivided the fire group based on landtype characteristics. Forests in the Parks

Plateau LTA tend to be all or nearly all lodgepole pine, and both lodgepole ecology and local fire history data suggest that it burns more often than forests with a mixture of lodgepole, spruce and fir. Based on these characteristics, we set the maximum practical rotation length for such stands at 120 years, or about halfway through the range given for Fire Group 8.

Forests in the Trout Slope LTA below 9500' are still predominantly lodgepole, and still fit best in Fire Group 8. However, they also have small amounts of spruce and fir present and would be expected to persist slightly longer than the Parks Plateau forests. We chose a rotation length of 150 years for these forests.

At the other end of the spectrum, Fire Group 11 forests have a more nearly equal mix of spruce and lodgepole and to occur on fairly moist sites. Where spruce dominates, large stand replacing fire is rare (occurring at intervals of 300 years or more). At the elevations found within the assessment area, however, lodgepole is still a major forest component and fire return intervals are influenced by the surrounding Fire Group 10 regime. We therefore chose a more conservative rotation length of 250 years for this area.

Fire return intervals for Fire Group 10 are described as intermediate between 8 and 11, so we considered rotation lengths in the 200-250 year range. Based on the amount of lodgepole present, the extent and severity of the last pine beetle outbreak, and the abundance of fire scars in the Fire Group 10 portion of the Trout Slope area, we set the rotation at the low end of this range (200 years).

Fire Group 5, which includes all of the areas within the Limestone Hills LTA, is very different from the other groups. There is much less lodgepole present, the fire regime is variable, and local fire history data are lacking. We chose to defer development of a sustained yield model for this type until we could work out a better description of the natural disturbance processes operating there.

These rotation lengths are defined as practical maximums, since to manage for anything longer would require prevention of natural mortality (treating to control insects, suppressing fire, etc.) Such a management strategy would be expensive, potentially disruptive to other components of the forest community, and in the long run is likely to have limited success.

It is possible to develop a sustained yield model based on shorter rotations than those defined above, by shortening or eliminating the oldest stages of forest development (through harvest). This would increase wood product availability, but would reduce availability of mature forests for wildlife and recreation and substantially change the scenic qualities of the area. Since the desired condition is to maintain all the current uses, including those that require older forest conditions, we did not consider shortening any rotations.

Working backward from these rotation lengths, the sustained yield model prescribes a mixture of forest stages to manage for at the landscape level (see following table). This mixture is necessary to provide for continuous replacement of old stands which are removed by harvest or natural causes. Managing a landscape in this fashion will create a diversity of structural stages, rather than the even-aged, homogeneous pattern lodgepole tends to develop in an unmanaged situation. Implementing this more diverse pattern will result in a limited number of acres that are susceptible to insects, disease or fire at any one time, and help avoid a repeat of the

widespread pine beetle outbreak of the early 1980s. Insects, disease and fire will still be present in such a landscape; they simply would not operate on as large a scale as they do now.

Forest type: Characteristic:	100% lodgepole at 8500'	80% lodgepole, 15% spruce, 5% fir at 9000-9500'	60-80% lodgepole, 15-25% spruce, 5-15% fir at 9500-10,000'	60% lodgepole, 25% spruce, 15% fir at 9500-10,000'
Landtype Assoc.	Parks Plateau	Trout Slope	Trout Slope	Alpine Moraine
Fire Group	8	8	10	11
Rotation length	120 years	150 years	200 years	250 years
VSS 1/2*	42%	27%	20%	16%
VSS 3	17%	13%	12%	12%
VSS 4a	33%	13%	16%	20%
VSS 4b		27%	12%	
VSS 5	8%	13%	18%	24%
VSS 6	0%	7%	22%	28%

*See Appendix 4 for VSS definitions

The sustained yield scenario described here is intended to provide broad, long-term management direction. No single management prescription can be expected to achieve desired conditions on every site within a landscape, so it is important that specialists consider site-specific conditions and adapt these guidelines as needed during implementation. For example, individual stands may need to be managed on shorter or longer rotations than shown here, based on site characteristics and the current mix of tree species. Pockets of nearly pure lodgepole in Fire Group 10 or 11 may not be able to survive 200-250 years. Conversely, there are areas in Fire Group 10 (e.g., some stands in landtype TS4) that are wetter and have a higher than usual percentage of spruce present. These stands may be expected to persist longer than 200 years. The rotation lengths given here are simply a generalized guideline, representing an average for the fire group as a whole.

Likewise, precise achievement of all the VSS percentages shown above is not practical given the long time frames involved, the variability in actual stand growth rates and the unpredictability of disturbance events. Instead, we offer this scenario as a means of developing forest vegetation management plans and projecting availability of forest products, including wildlife habitat and recreation opportunities as well as wood products. Success will be defined by designing and evaluating site specific projects on the basis of their ability to move us toward the desired vegetative mix, and a general trend toward that mix at the landscape level.

Additional information on desired conditions for recreation and watershed can be found in Appendix 2A and 5, respectively.

MANAGEMENT OPPORTUNITIES

The bar charts (Fig. 5) and the table on page 40 show the difference between existing and desired VSS composition by Fire Group/LTA. Each bar chart shows a slightly different situation, with corresponding differences in the kinds of forest vegetation management needed over the short-term (say, the next 10 years) in order to get us moving toward our long term goal (approximation of the desired VSS mix). This section provides some landscape level management recommendations by Fire Group/LTA. These recommendations are phrased in very broad terms; the most important part of each is the goal it is intended to achieve. As always, specific silvicultural practices necessary to meet these goals will need to be worked out by the appropriate specialists, with consideration of site-specific conditions and the implementation guidelines in the next section.

When deciding what stands to harvest, remember to consider patch size, watershed conditions and local VSS distribution patterns. Although more openings may be desirable at the landscape level, VSS patterns must also be monitored at the individual watershed level to be sure that equivalent clearcut acre thresholds are not exceeded. Also, remember that small patches of forest contribute to total acres of VSS 4, 5 and 6 without actually providing habitat for many wildlife species. Where small patches are common (Fig. 3a), consider them for harvest first. If they cannot be harvested due to big game security needs, watershed limits, visual concerns or other issues, it may be necessary to maintain a temporary surplus of these VSSs to compensate for their lower value. Finally, plan management to approximate the desired VSS mix at the compartment or watershed scale as well as at the scale of the Fire Group. For example, don't harvest all the VSS 5 and 6 east of Manila Park simply because those VSSs are common west of Manila Park. Try to distribute each VSS across the whole landscape in proportion to the ability of local sites to regenerate or achieve VSS 6 conditions.

(Note: existing conditions were extrapolated from stands for which we have exam data, or about 40-50% of the total assessment area. These bar charts should be updated annually with new stand exam data and to reflect any vegetation management done).

FIRE GROUP 8 (PP and LOWER TS LTA):

In Fire Group 8, the existing proportions of VSS 1 & 2 (youngest forest patches) are below the proportions desired; and existing proportions of VSS 4 (mid-aged forest patches) and 6 (old forest patches) are above the proportions desired. The VSS 6 stands are largely composed of beetle-killed trees, and are gradually being converted to earlier (VSS 3 and 4) stands as those trees fall. The effect is to increase the surplus of 4b stands in the PP LTA, and to create a surplus of 4b in the TS LTA.

All the VSS 6 stands in the PP LTA, and most of those in the lower TS LTA, should be salvaged (barring site-specific needs for retention). Many 4b stands should also be considered for harvest. Clearcutting will be most common harvest method, but selective cuts could be used where there is a residual green component in the overstory and/or advanced regeneration present in the understory. Selective cuts would be a good choice where it is possible to leave a live, VSS 4b stand after harvest, and should be designed to leave a total basal area that is conducive to rapid growth and development of large, well spaced trees. This would be one way

to promote rapid recruitment of stands into VSS 5 in the TS LTA (which will begin to show a deficit as the dead overstory falls). Some of the surplus 4b in the TS LTA should be kept for this purpose.

In the long term, we envision this Fire Group as the part of the landscape where we will do the most intensive timber management, and where clearcutting will be most common. It will have fewer opportunities for primitive recreation experiences than the other fire groups. Values around developed campgrounds and popular dispersed recreation sites will need to be protected through implementation guidelines (next section). Wildlife communities will be those typical of mid-aged forests rather than old forests. Goshawks presently occur in this fire group, and VSS 4b, 5 and 6 (totalling 8% of the PP LTA and 47% of the TS LTA) will continue to provide nesting habitat for them.

FIRE GROUP 10 (UPPER TS LTA)

This Fire Group currently has a slight surplus in VSS 4b, and a deficit in VSS 5. Both imbalances will increase over the next several years, as the dead overstory falls. As indicated in Appendix 4, VSS 4b stands offer some of the same habitat values as older (VSS 5 or 6) forests. This surplus is therefore able to compensate in some ways for the lack of VSS 5. It may also be possible to manage for rapid development of VSS 4b stands into VSS 5 (e.g., through selective cutting to increase growth rates).

We recommend salvaging the dead from most existing VSS 6 stands, since there will be adequate old forest left after the dead is removed. However, the live component should be left (and will need to be protected during harvest operations). There are also some imbalances in distribution of the older VSS classes that need to be considered. Figures 4 and 5 indicate that most of the VSS 5 and 6 that will remain after loss of the dead overstory occurs from Manila Park west, while the only VSS 5 and 6 available in the eastern third of the Fire Group is that which is provided by largely dead stands. Some of these dead stands should be retained for the values they provide, even temporarily, in this portion of the landscape. Salvage or selective harvest of VSS 5 and 6 stands in this area should be designed to leave a VSS 4b stand structure, since that will continue to provide some VSS 5 and 6 functions.

In the long term, we envision less clearcutting in this portion of the landscape than we have done in the past. Harvest will be designed around a variety of selective cutting strategies (e.g., diameter limit cuts or individual tree marks) with the goal of developing and maintaining late VSS stands through the desired rotation length. Clearcutting will still occur, especially in pockets of nearly pure lodgepole, or where there is a need to control mistletoe, or some other site-specific condition warrants it. However, it will be less common than in Fire Group 8.

Overall, it will have a less intensively managed character than Fire Group 8, with more opportunities for dispersed camping and hiking in relatively primitive surroundings. The desired VSS mix meets the management recommendations for marten, which is very sensitive to habitat fragmentation and availability of mature and old forest habitat. VSS 4b, 5 and 6 (about 52% of the desired mix) will provide structurally suitable goshawk nesting habitat. The 20% of the area which will be in VSS 1/2 will provide foraging opportunities for big game which are about equal to current conditions. If managed for appropriate patch sizes and with

consideration of factors such as slope and water sources (see implementation section), this fire group should provide good habitat for a wide variety of wildlife.

FIRE GROUP 11 (AM LTA)

There is a small surplus in the old forest stage (VSS 6), and a corresponding deficit in the early stages (VSS 1/2) of this fire group. Opportunities exist to harvest trees in some VSS 6 stands in order to provide wood products or deal with insect or disease situations; Clearcutting will be relatively rare, compared to other fire groups, but will still occur (usually as very small patch clearcuts due to regeneration needs of the tree species present; see next section). As in Fire Group 10, most timber management actions will be designed to produce and maintain older stand structures over the 250 year rotation selected for this area.

This Fire Group will have the most primitive character of the four in the assessment area. Evidence of timber management will be slight, and will not greatly alter scenic qualities. Popular dispersed recreation sites and activities will continue as they are now. This fire group provides the highest percentage of old forest habitat among the three fire groups, with only 16% openings. It will favor wildlife species dependent on older forest structures.

CAUTION: existing percentages of each VSS in Fire Group 11 were calculated without information on Compartment 216, Stand 26 (1078 acres). We have data for this stand which would classify it as VSS 4b; however, this data was collected in 1976 and may not reflect the current stand structure. Because of the large size of this stand (it's nearly 10% of Fire Group 11), its VSS classification has a big effect on the overall distribution. Rather than use a potentially inaccurate VSS, we distributed the 1078 acres evenly among VSSs 4b, 5 and 6. We feel this is a reasonable approximation of current conditions. However, new data should be collected on this stand and the existing VSS mix recalculated before planning any major vegetation management projects.

EXISTING and DESIRED CONDITION

VSS by Fire Group and LTA	Existing VSS mix (all trees)	Desired VSS mix	Existing VSS mix (live trees only)
FG 8, PP LTA			
VSS 1 and 2	11%	42%	11%
VSS 3	12%	17%	18%
VSS 4a	23%	33%	35%
VSS 4b	28%	0%	28%
VSS 5	7%	8%	7%
VSS 6	20%	0%	1%
FG 8, TS LTA			
VSS 1 and 2	12%	27%	12%
VSS 3	7%	13%	15%
VSS 4a	15%	13%	28%
VSS 4b	25%	27%	36%
VSS 5	19%	13%	6%
VSS 6	22%	7%	3%
FG 10, TS LTA			
VSS 1 and 2	19%	20%	19%
VSS 3	7%	12%	11%
VSS 4a	4%	16%	8%
VSS 4b	30%	12%	38%
VSS 5	12%	18%	2%
VSS 6	29%	22%	22%
FG 11, AM LTA			
VSS 1 and 2	11%	16%	11%
VSS 3	15%	12%	15%
VSS 4a	2%	20%	5%
VSS 4b	17%	0%	14%
VSS 5	20%	24%	21%
VSS 6	35%	28%	33%

NOTE: Limestone Hills LTA/FG 5 reserved pending development of desired VSS mix

IMPLEMENTATION GUIDELINES

This section lists implementation guidelines to consider in designing how and where to provide the desired mix of VSSs within each Fire Group/LTA, or on the overall landscape. These guidelines address such things as arrangement, size, and conditions of various VSS patches and should be used in conjunction with the management opportunities suggested above.

These guidelines will need to be reviewed regularly and supplemented or modified to keep them up-to-date with latest scientific research, monitoring results, and changing social values.

OVERALL LANDSCAPE

Silvicultural treatments for establishment of timely (5 year) regeneration (VSS 1) can be hindered in areas with high or fluctuating water tables, where bluejoint grass is well represented, or where the top layers of soil are excessively disturbed over large areas.

In VSS 1 patches where animal damage to regeneration (usually lodgepole pine and aspen) could be excessive (see 1995 study, D.Wilson), design and arrange patches, manage slash, or develop other means to discourage big game use.

Small patches (one to several acres) of young VSS or other VSS classes with relatively open overstory can be useful for dispersed recreation activities such as roadside camp spots, jumping-off places for hikers, ATVs, etc, and providing views of distant landscapes or features. Patch clearcuts, removal of overstory over existing young trees, shelterwood cuts, and thinning can be employed.

Large patches (> 40 acres) of VSS 1 will not be created by management practices due to NFMA and Forest Plan constraints on size of openings. However, once regeneration within small VSS 1 patches become dense enough and tall enough to serve as wildlife cover, leave strips separating the patches can be modified to create larger patch conditions if desired. This is consistent with Franklin and Forman's (1987) recommendations for creating landscape patterns in forested areas, in which they suggest reducing emphasis on dispersing small clearcut patches through forested landscapes. Instead, they suggest approaches which feature "progressive or clustered cuts from scattered nuclei" in order to reduce disturbance associated with edge effects and the need to build or maintain roads.

Retention of some snags (clusters and scattered individuals) and large woody material in larger openings should be done to supply an old forest component of diversity in the larger patches of younger VSS created and to provide for soil protection and nutrient cycling. This will also facilitate wildlife travel through such openings, by providing islands of cover.

Provide big game cover areas in proximity to meadows and created openings to be at least 600 feet wide and 60 acres in size, or at least 250 acres where vulnerability to hunters and density of open roads is a concern. Blocky patches are better than long, narrow patches. This guideline will better meet Forest Plan standards than the current practice of leaving strips that are one elk sight distance (70 yds) wide.

Provide a relatively steady supply of a variety of wood products to sustain a viable timber industry (retain the tool for future use), encourage diversification of timber industry, and meet personal needs of the public.

Plan timber harvest around existing roads or construct low standard roads and on gentle slopes (generally less than 30%) where possible to minimize costs and impacts to other resources. Make excess dead and down wood and slash accumulations available to the public for personal uses.

Manage human access and open road densities in hunting season and throughout the year to help meet big game hunt quality objectives and hunter success goals of UDWR.

Control is generally the most appropriate fire suppression response for providing "cost efficient protection of Forest resources, users, and administrative sites" (Forest Plan IV-54). Consider contain or confine strategies:

- in areas of non-continuous fuels.
- in areas isolated by natural barriers or sparse fuels.
- in extremely steep or rugged terrain (e.g. canyons) where firefighter safety could be jeopardized.
- during periods of low fire potential.

Plan for improving snag diversity and replacement in the long term to be proactive to the predicted diminishing value of existing same-aged snag condition to three-toed woodpeckers and bats. Expect three-toed woodpecker population to decline as current snag density and quality decreases.

FIRE GROUP 8

In the Parks Plateau LTA portion:

Manage for even-aged stands of climax lodgepole pine, and/or climax lodgepole with seral aspen to mimic historic fire influence, but not at the scale of historic fires (thousands of acres). Stands should be fairly dense, with closed canopies and relatively smaller diameter trees in most cases.

Look to create VSS 1 patches first where seral aspen is a stand component to sustain diversity within the stand over time for wildlife and visual quality and to perpetuate aspen where it is in a declining, decadent condition.

In the lower Trout Slope LTA portion:

Manage for even-aged, large stands of persistent lodgepole pine with generally sparse ground fuels to mimic historic fire influence. Retain at near current levels the proportion and arrangement of stands with mature subalpine fir and spruce components to provide diversity within patches and across the fire group/LTA. Stands with a mature component of spruce and fir suggest these components are sustainable over a rotation age, whereas stands in which fir and spruce have become newly established under the beetle killed lodgepole pine canopy where mature spruce and fir are sparse or missing may not be.

Strategically intersperse older VSS patches of 200-300 acres between patches of 1200-1800 acres to serve as stepping stones for interior forest dependent species.

Throughout Fire Group 8:

Create a mosaic of highly variable patch sizes (a few acres to occasionally several hundred acres) and VSSs to provide forest diversity and discontinuity in an attempt to deter very widespread, unplanned disturbance patterns (e.g. future beetle outbreaks, fires).

Since large (several hundred acres), green, mature forests are uncommon in several areas, these kinds of patches should be maintained as long as needed to sustain a full range of wildlife species and continue to provide this element of diversity on the landscape. Maintenance activities could include removal of some diseased trees, thinning, and fire hazard reduction practices. Where possible, openings created during maintenance activities should be kept small (0.75 to 4 acres) in order to retain habitat values for forest dependent wildlife. Some large, dead mature forest should be retained as well until enough green stands (VSS 4, 5, 6) can replace them.

Sparse small (< 3"diameter) ground fuels ($\leq$ 5 tons/ac) and limits on proportions of standing dead materials in patches should be emphasized. Slash piling and burning in all VSS patches can be effective means for woody debris management as long as it's done with care to protect the soil. Prescribed broadcast burning can be used in newly created VSS 1 patches to reduce slash and aid in site preparation for natural regeneration and seed release from lodgepole cones.

Strategically arrange different sized patches of different VSSs and patches of lower density to aid fire protection or control effectiveness near areas of important resource concerns:

- popular dispersed recreation sites (Round Park, Kane Hollow), Oaks Park Summer Home Area and Campground, Kaler Hollow Campground, East Park Campground
- identified areas of key wildlife habitat (occupied goshawk nest stands, calving/fawning areas)
- critical watershed areas
- areas where adjacent fuel load is high or has potential for large fires (hundreds to thousands of acres)

Maintain tree health and vigor around campgrounds and most popular dispersed recreation sites for safety and visuals. This probably means managing for VSS 4 and 5 with some bigger trees present, but not VSS 6 since it usually includes a significant decadent component. Where rejuvenation of deteriorated stands is necessary, group shelterwoods or small patch clearcuts should be considered.

Areas of concentrated firewood gathering near roadsides should be considered for slash treatment to lower person-caused fire risk. Locating a timber stand management treatment in these areas may be a more cost effective way to get treatment of residual slash without using budget dollars entirely. For example, placing a commercial thinning operation in a residual green stand may meet dual purposes of sanitizing or fine-tuning the stand VSS while treating the slash created by previous dead fuelwood harvest.

Canada thistle, a noxious weed, can readily colonize sunny areas of freshly exposed soil (like those in clearcut areas and/or where slash has been machine piled). It may be possible to use K-V funds for treatments.

FIRE GROUP 10, UPPER TROUT SLOPE LTA

Manage for large stands of mixed conifer forest dominated by lodgepole with some inclusions of smaller stands of different ages and species mixes to mimic historic fire influence and provide diversity within patches.

A higher proportion of older, stable VSS classes (VSS 4, 5, 6) should be maintained along streams, sensitive riparian areas, and wildlife migration corridors, in known goshawk territories, and in critical view areas (possibly from campgrounds, popular dispersed recreation sites, the Red Cloud Loop Road Scenic Backway, and other heavily travelled routes). Maintenance can include practices that selectively remove hazard trees, diseased trees, pockets of blown down or diseased trees, or thinning.

Consider maintaining forested areas which occur on the TS4 landtype. This landtype often follows riparian corridors or the edges of meadows, and in general tends to be wetter than other TS landtypes. Bluejoint often occurs in the understory, indicating potential regeneration problems. TS4 stands also tend to have a higher percentage of spruce, and lower percentage of beetle kill. This makes them more stable than stands with largely dead overstories.

Since large (several hundred acres), green, mature forests are uncommon in several areas, these kinds of patches should be maintained as long as needed to sustain a full range of wildlife species and continue to provide this element of diversity on the landscape. Maintenance activities could include removal of some diseased trees, thinning, and fire hazard reduction practices. Where possible, openings created during maintenance activities should be kept small (0.75 to 4 acres) in order to retain habitat values for forest dependent wildlife. Some large, dead mature forest should be retained as well until enough green stands (VSS 4, 5, 6) can replace them.

Intersperse older VSS patches of 200-300 acres between patches of 1200-1800 acres to serve as stepping stones for interior forest dependent species.

Maintain dense VSS stands (VSS 3, 4, 5, 6) between Lonesome Park and Oaks Park allotments to serve as livestock travel barriers.

Strategically arrange different sized patches of different VSSs and patches of lower density to aid fire protection or control effectiveness near areas of important resource concerns (see appropriate maps in Appendix 3):

- popular dispersed recreation sites
- identified areas of key wildlife habitat (occupied goshawk nest stands)
- critical watershed areas
- areas where adjacent fuel load is high or has potential for large fires (hundreds to thousands of acres)

FIRE GROUP 11, ALPINE MORAINE LTA

Manage as a matrix of older VSS mixed conifer forest, tending toward Engelmann spruce/subalpine fir climax community, with some inclusions of smaller stands/patches (a few acres to tens of acres) of initially high seral species component (yielding to higher climax species mix over the long rotation term) to mimic historic disturbance regimes and provide diversity within the matrix. Maintenance of the matrix can involve small or large area selection cuts, to sanitize and salvage, or thinnings. Where rejuvenation is desired, either to treat pockets of blow down, beetle kill, or disease, or to add diversity, treatments could include: patch clearcuts (from 0.5 acre to several acres, depending on tree species to be regenerated), patch shelterwoods, group shelterwoods, and overstory removals.

FIGURES

1. Location of the Trout Slope Assessment Area

2. Landtype Associations and Fire Groups

3. Existing VSS Mix (Live and Dead Trees)

3a. Existing VSS Mix with 300' Buffer around Clearcuts

4. Existing VSS Mix (Live Trees Only)

5. Existing and Desired VSS Mix by Fire Group

Fig 1: Location of the Trout Slope Assessment Area

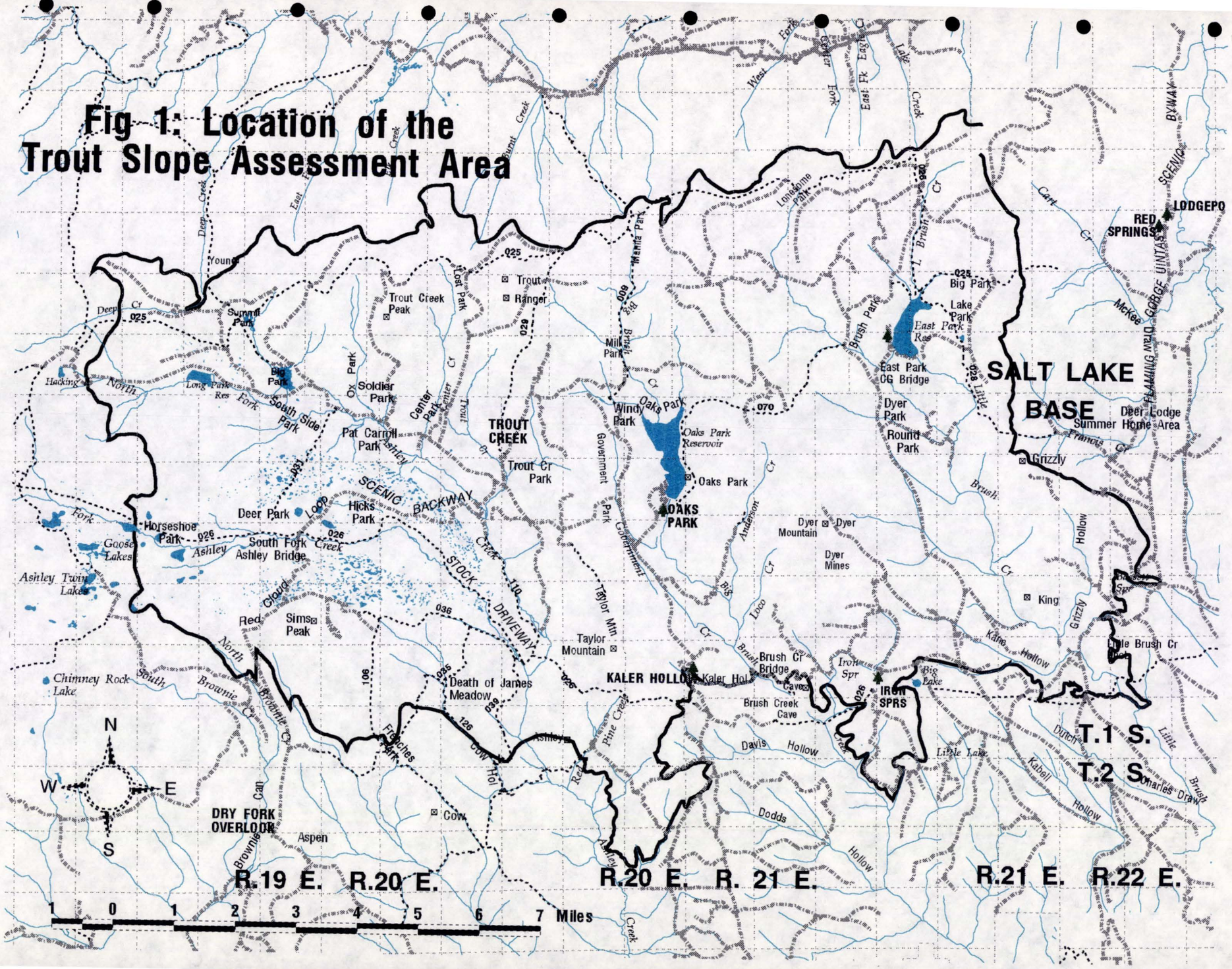
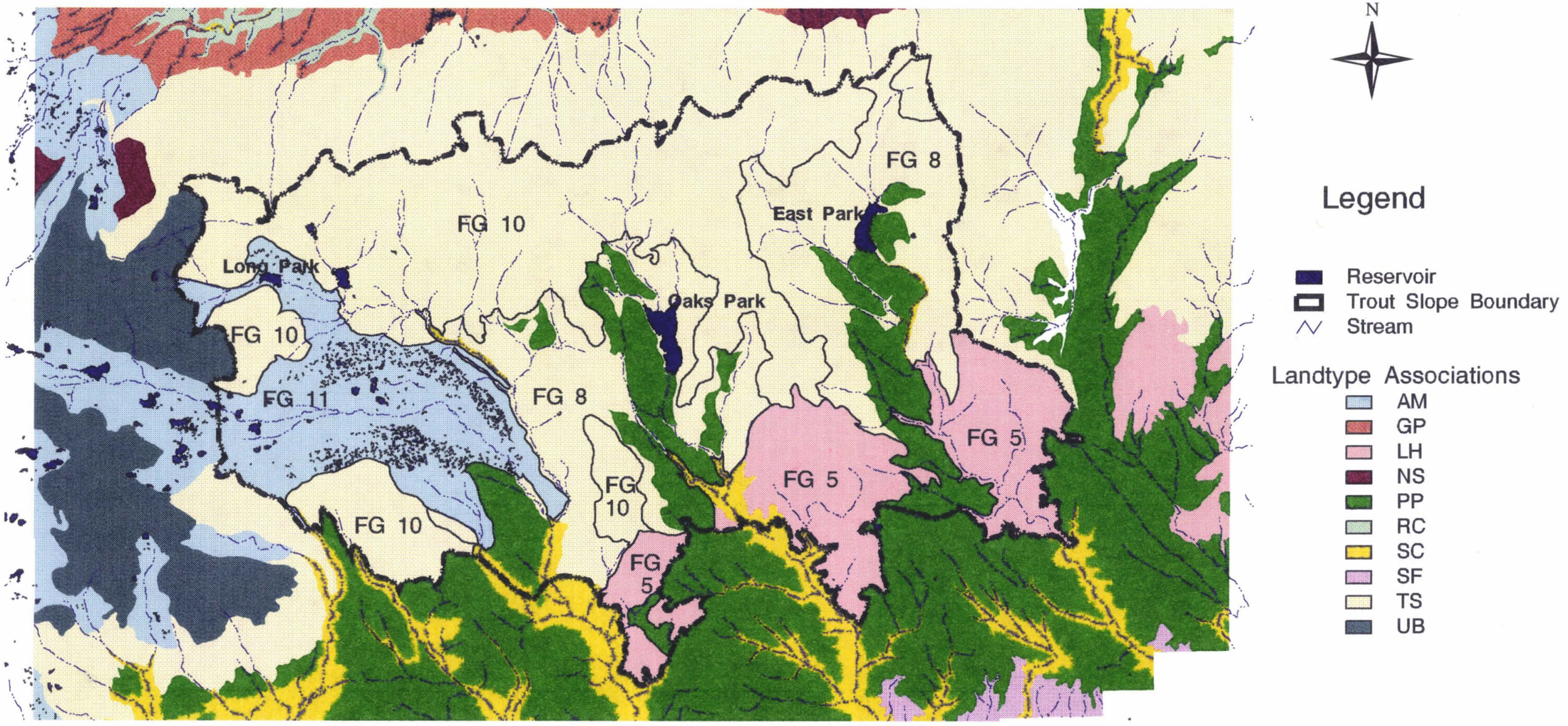


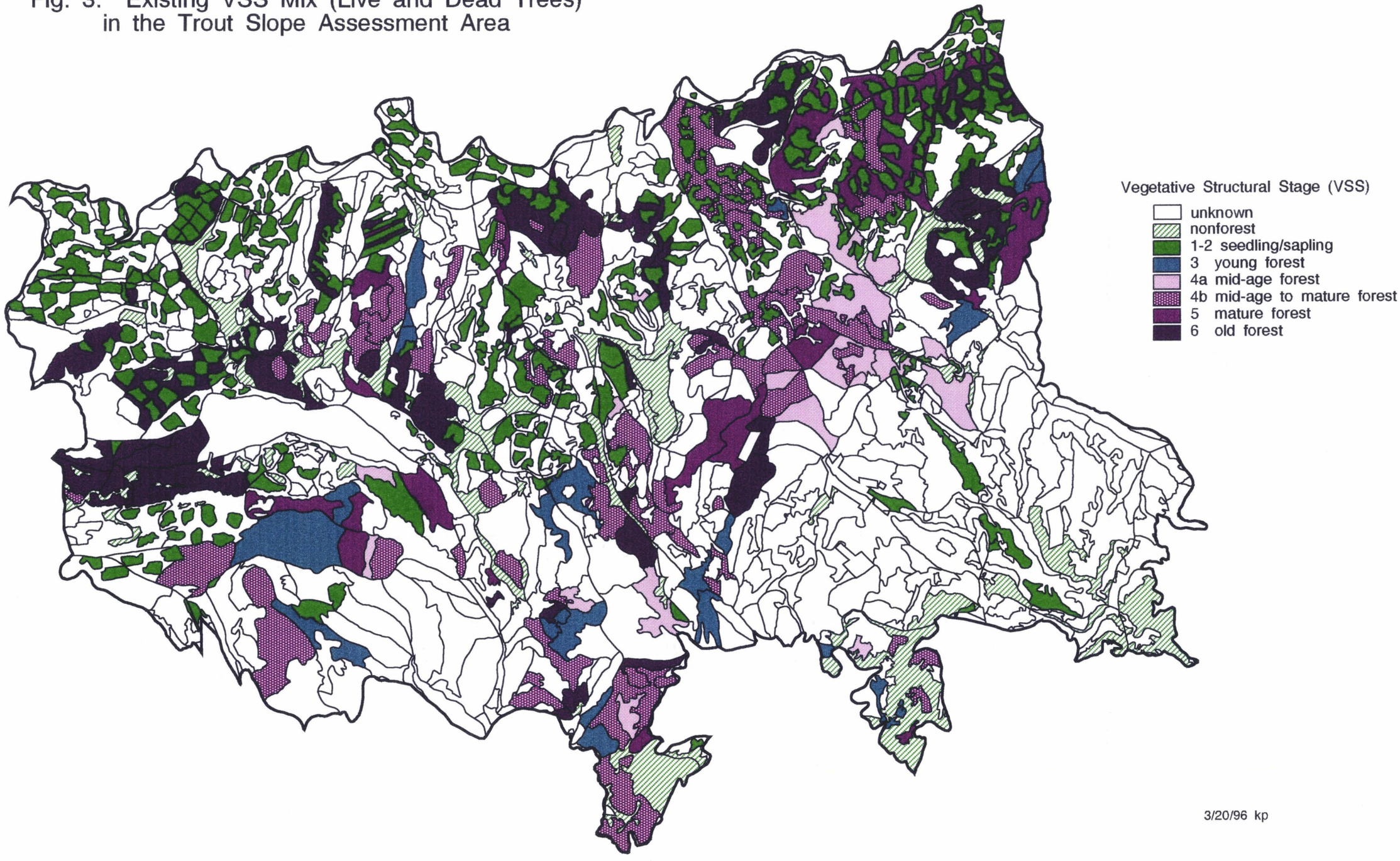
Figure 2: Landtype Associations and Fire Groups in the Trout Slope Assessment Area



Fire Groups

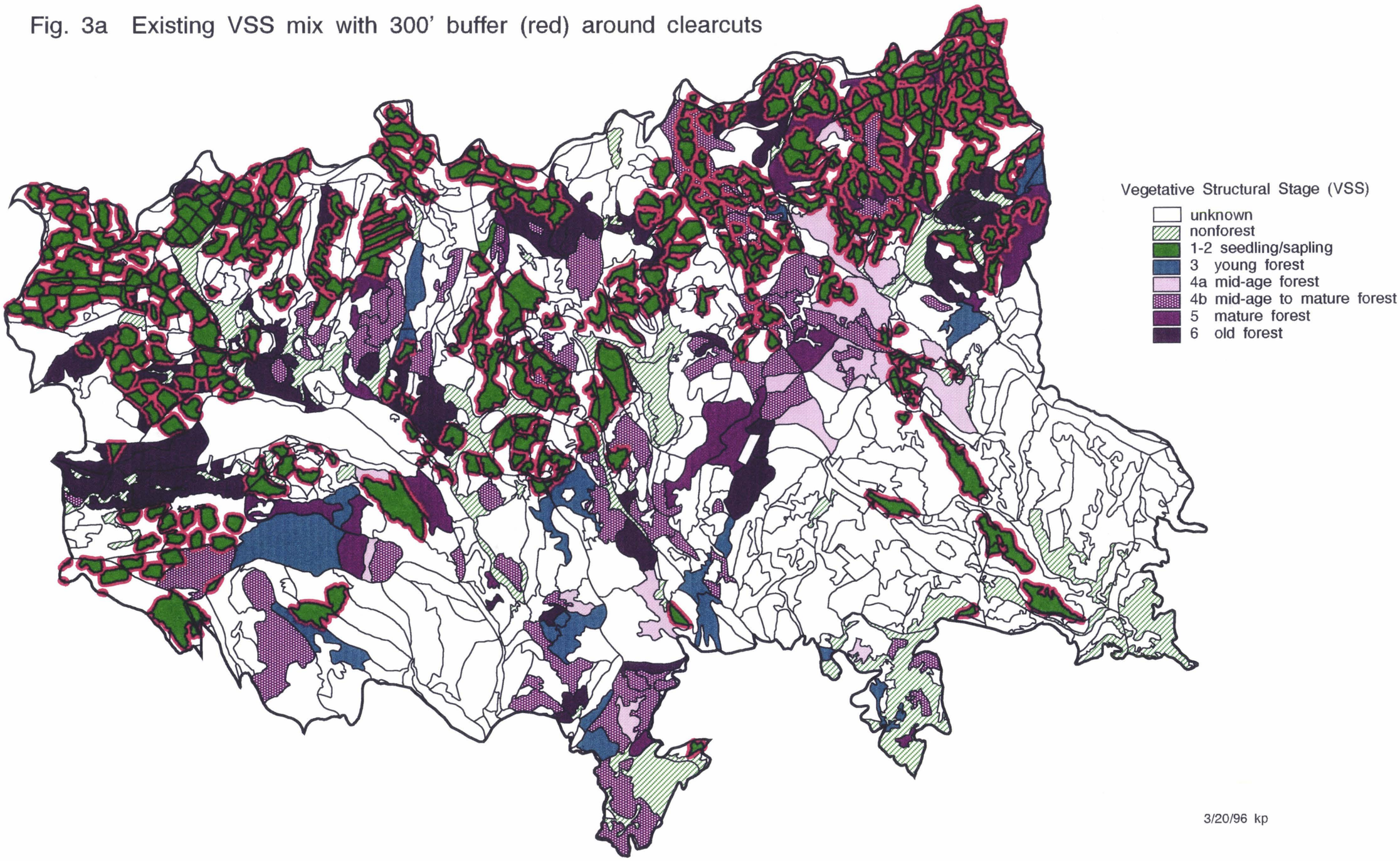
- FG 5: Cool or moist Douglas Fir habitat types (12,284 acres)
- FG 8: Habitat types with persistent Lodgepole Pine (27,514 acres)
- FG 10: Dry, lower Subalpine habitat types (29,396 acres)
- FG 11: Moist to wet Subalpine habitat types (11,416 acres)

Fig. 3: Existing VSS Mix (Live and Dead Trees) in the Trout Slope Assessment Area



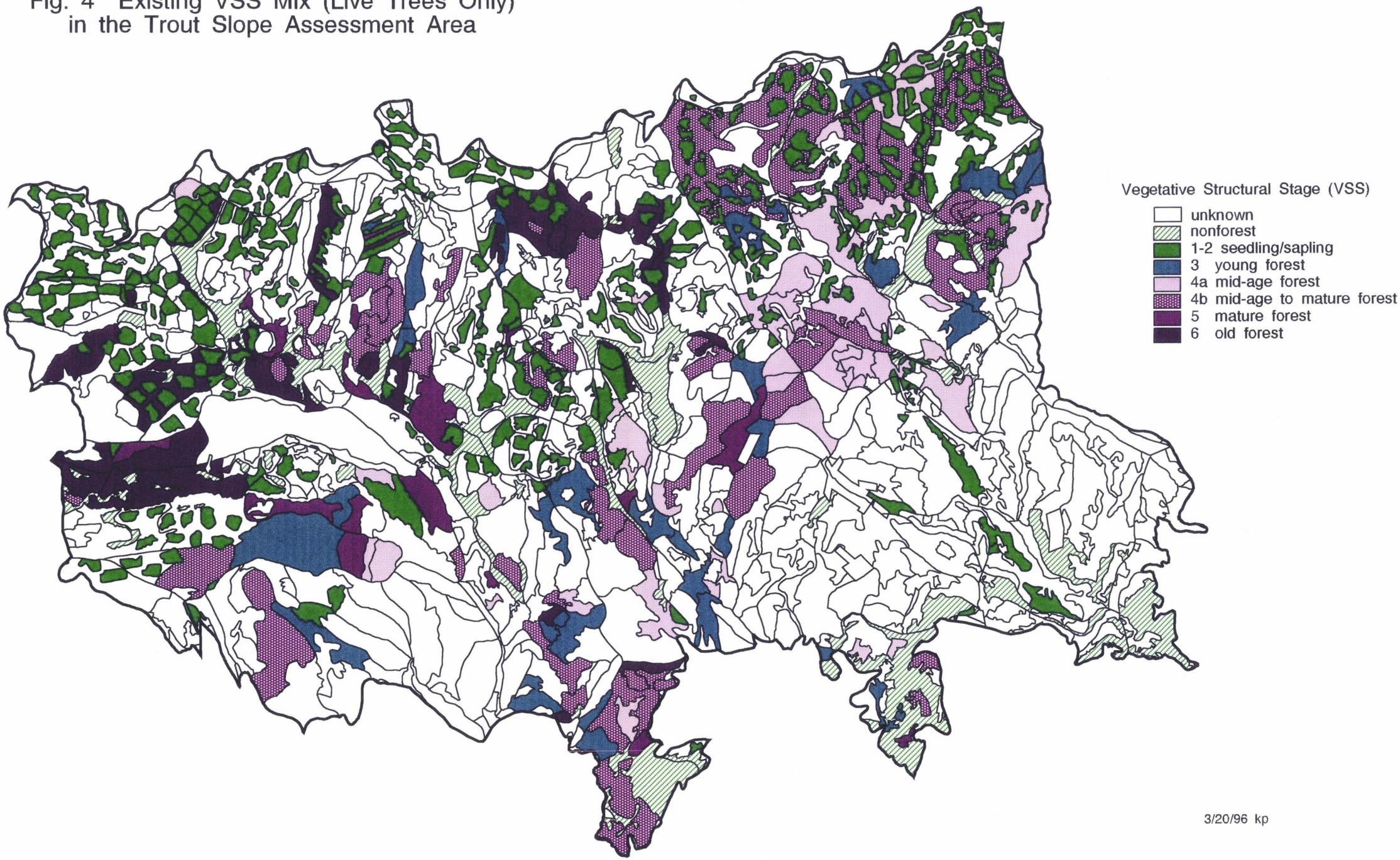
3/20/96 kp

Fig. 3a Existing VSS mix with 300' buffer (red) around clearcuts



3/20/96 kp

Fig. 4 Existing VSS Mix (Live Trees Only)
in the Trout Slope Assessment Area



3/20/96 kp

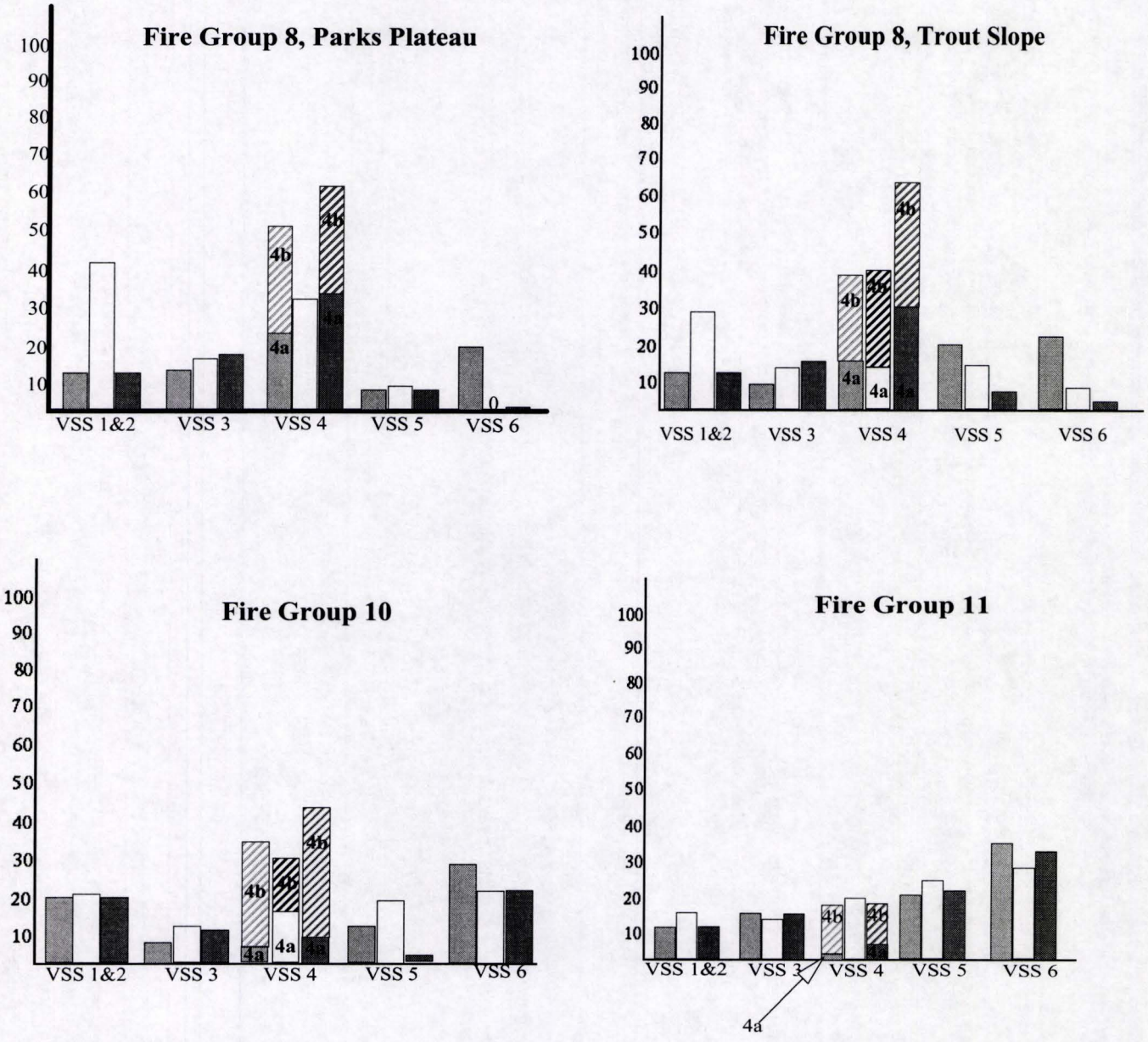


Fig. 5 Existing and Desired VSS Mixes by Fire Group

APPENDIX 1

Summary of Public Comments

Analysis of Comments Received

SUMMARY OF PUBLIC COMMENTS

9/11/95

Types of Contacts:
Letters: 25
Phone/Personal Conversations: 3
Slide shows & Discussions: 6 (two internal, one BLM, one interagency meeting, one Vernal Chamber of Commerce, one Uintah Mountain Club)

Names/numbers of commenters:

1. Estelle Richins, Vernal
2. Greg White, Lehi, UT
3. Bob & Linda Garner, Ogden, UT
4. Tom Elder, Vernal
5. Curt Sinclear, Vernal
6. Norm Pease, Vernal
7. Audrey Slaugh, Vernal
8. Tom Howells, Vernal
9. Dick Carter, UWA, SLC, UT
10. Richard Fisco, Myton, UT
11. Clint McKnight, Vernal
12. Carl Woodmansee, LV, NV
13. Tim Sweeny, Vernal
14. Ted Lovett, Vernal
15. Robert Jarrett, Roosevelt, UT
16. Wayne Bullock, Vernal
17. Dr. Ed Oscarson, Vernal, UT
18. Jerome Brady, Kaysville
19. Lou Leidwinger, Vernal
20. Randy Simmons, no address
21. Anon., no address
22. Bonnie Mathias, Layton, UT
23. Laird Hamblin, Cedarview, UT
24. Will Durant, UMC, Vernal
25. David Richerson, Deer Park, TX
26. Dale Merrell, Vernal
27. Rick Larsen, UDWR, Vernal
28. C. Carmichael, Richfield
29.

17-19 local; 7-9 in-state; 2 out-of-state

Names of others that commenters said may be interested in commenting:
Les Bennett, Roosevelt, UT
Charles Brewer, Kaysville, UT
Lester Mathias, Layton, UT

Specific Comments: (more or less paraphrased - key phrases, terms used in most cases to retain context of comments; tried to use comments that expressed likes, dislikes, do's & don't's, or reflected a value, priority, primacy about past, current or future management.)

1. Advocate for handicapped (wheelchairs) access at dispersed recreation sites (Trout Creek fishing access near road; need turnouts on No. East Park Loop about 2 mi. past guard sta. capable for unloading wheelchairs via lift; policy on using machines to deliver handicapped persons to fish Trout Creek or access wilderness, Queant Lake). Horse trips in backcountry too

hard on handicapped/wheelchair bound.

Allow loop roads for trailer parking (prim. rd across creek to sheep camp half way to guard station).

Improve roads: blind corners, narrow surfaces, tight spots when encountering log trucks particularly where road is lined by boulders or big trees (remove boulders 3/4 mi past Kaler). Rough, dusty surface (Taylor Mtn Rd from boundary to Mud Spring - fix it).

2. Very happy to see new ATV trails.

Dead wood needs to be taken.

But sale areas are looking terrible. Leave green trees, and clean up area better.

Return the Kaler Hollow water pipe for convenient public use.

Impose and enforce speed limit on logging trucks.

3. Whatever you have been doing, just keep doing it.

Area is accessible but not over run (keep it that way).

Area offers variety of recreation opportunities.

Area appears clean and natural (keep it that way).

Carefully manage the livestock grazing.

Plant more hearty fish (native cutthroats, catch and release or low limits), improve fish habitat, protect water quality.

Selectively cut the dead trees only, and burn all slash piles.

4. Salvage logging has increased water yield. Show the data this is based on.

Goshawks need mature forests. Show the data this is based on.

Want large % (10%) set aside as climax old growth forest across as wide a range of species as possible.

Want to perpetuate mature ponderosa pine forests and other fire-maintained plant associations (use rational Rx fire, thinning, reduce emphasis on suppression).

Want logging roads barred effectively.

Resist introduction of exotic wildlife species (game birds, goats etc).

5. Interested in OHV use in area, year round (seasonally open & closed areas, year round use areas, mixed use areas - xc skiing w/snowmobile).

6. Keep area open for multi-purpose, all different types of use: loggers, campers, ATVs, fishing, hunting, hiking, biking.

Specifically, keep roads and trails open for ORV travel (map of road out of Deer Lodge attached).

Re-open road to Leidy Pk - closing it has created an artificial wilderness area closed to campers just because someone caused some damage years ago; it shouldn't be locked up forever (solve problems by placing rocks or trees to control traffic).

7. Leave the slope alone - makes an additional cost when things are improved (campgrounds, lakes) to those on fixed incomes; bars them from entry/use.

Let people help clean up areas by taking the dead stuff and otherwise help to maintain [assume at/near recreation sites].

Too much grazing land being closed; ranchers need more consideration.

Need to be able to drive right to the streams to fish (lesser-abled); have found so many roads locked.

Like to get away from town noise and people; like to see wild animals, birds, plants, and flowers; like to wade in streams barefoot with grandchildren; like to camp out but not where neighbors are closer than at home - and usually drunken and noisy.

You can help nature, but you can't improve it.

8. Supports the idea of multiple use.

Uses the area for fishing, camping, hiking, xc skiing (continue the yurt - excellent idea), and biking; scenic beauty important in all these activities and wishes to preserve it as much as possible.

Like to see more dead trees available for firewood.

Opposed to allowing more permanent uses such as summer homes.

9. Want landscape to be dominated by natural processes and disturbance regimes; managed under principles of conservation biology where products/outputs are secondary to what is left for ecosystem function independent of human intervention - aka restoration ecology. Want

landscape heavily burdened by past outputs of timber pieced back together and allowed to develop largely within its own constraints.

Sustain integral forests by not intervening in their broad systemic functions over any sustained period of time.

Dislike cultural impacts that take away forest complexity, diversity, and variableness.

Dislikes control treatments that may actually maintain or enhance pine beetles and mistletoe; likes a dynamic and ever-changing forest structure which has mistletoe and pine beetles built in.

Dislike extent of clearcutting and it's effects on form and function of this forest.

Wants no additional timber harvest as part of a routine management scenario.

Wants no additional roads or motorized access. Wants all remaining unroaded areas or drainages where logging has not occurred to maintain that character as a source for recovering the entire area to an integral ecosystem (eastern 1/3, a few northern drainages, isolated drainages in the western 2/3).

Landscape dominated by developed recreation with dispersed recreation not impairing, but basically encompassing, the areas with unroaded, unlogged character.

Base inventories on wildlife and various interactions within the most developed portions and least developed portions of the landscape.

Initiate research to determine suitable and occupied native cutthroat trout habitat.

Manage non-forested vegetation system to ensure that enough forage is left to maintain ground cover (litter), hiding cover for small mammals, forage for all wildlife, and fuel for natural fires. Concerned about trampling, soil compaction and lack of plant litter on many soils in this landscape. Trend should be toward potential natural communities; unsuitable sites not within active grazing scenarios.

Predators should not be perceived as pests; predator control should be abandoned or done only on a site-specific corrective process.

Opportunity exists to manage wildlife and people in this area with emphasis on nonconsumptive/watchable wildlife programs.

Minimize fragmented forest systems and allow those systems to fragment themselves via natural disturbances, recognizing this is not a undeveloped region. Link from unharvested/ungrazed buffer areas to the managed areas across drainages and surrounding landscapes.

This is a highly roaded area dominated by human influences and recreation.

Maybe prescribed fire will be key to integral restoration.

10. Would like to eliminate dead snag infested areas (rec. prescribed burns).

Close some 4WD trails people insist on using. No OHVs off the main road - detriment to forest and aggravation to those who refuse to use them.

Leave Red Cloud Loop as is, do not pave, to retain thrill of using area in as much of its primitive appearance as we now enjoy.

Improving camping facilities/comforts is getting out of hand; fee rates are ridiculous. Keep it basic and reasonable for everyone to use.

Some of the prime wildlife range is being stripped by cattle. Restrict the number of cattle; don't utilize summer wildlife range.

11. Maintaining wildlife habitat must be integral to any multiple use plan; should be based on healthy predator/prey ecosystems, not game harvesting.

Use only non-lethal predator control where natural predators conflict w/ livestock.

Allow fire its rightful role in ecosystem evolution; control only when lives or significant structures are threatened.

Disallow sheep grazing above road's end at Hacking Lake, where the transition forest of sub-alpine fir is too fragile, where grazing mars the uniquely accessible tundra landscape, and destroys its wilderness qualities.

Restrict ATV use in parks, riparian and other fragile areas (ATV damage in marshes on Hacking Lake).

Further encourage visitors not to trash (litter and ashes) primitive campsites.

Red Cloud Loop should remain unpaved with minimal grading.

Declare remaining old growth off limits to logging.

The importance of the recreational qualities of the area cannot be overstated. Preserve the unhindered opportunities for primitive camping, aspen groves, streamside fishing, and tundra walks. Focus rec mgt funding on interpretive efforts (waysides, trails and educational displays).

12. No comments due to lack of time.

13. No way the forest can sustain a cut to facilitate all the timber operators.

With the lack of timber, more resources need to be channeled to the increased recreational use (increase rec staff and law enforcement to control damage to the forest).

Elk herds do tremendous damage to cutover areas; elk herds are too large; wildlife comprises more than game animals.

Multiple use includes a properly managed grazing program which needs monitoring and cooperation with grazing permittees to make yearly decisions.

Manage the watershed for good, clean drinking water.

Want reasonable access to forest; road maintenance funded publicly if timber companies aren't operating.

All forms of recreation are going to be more regulated in the future. Do not like regulations, but with increased usage, someone has to make sure or heritage is not destroyed. Educate horse people to leave least impression; ticket litterers; examine places for ATVs & mtn bikes very carefully before designating for that use.

Boundary of Trout Slope should be forest-wide or district-wide assessment; think Lakeshore Basin over to Mosby Mtn should be included in any assessment that borders them; the boundary should at least be from drainage to drainage.

14. Carter Trail from Browne Lake to Youngs Spring very beautiful except for litter and other human evidence. One of the nicest spots in the country: flowers and wildlife and all things important to life. [Outside TS area]

You try, but you cannot do it all.

15. Enjoy camping and riding horses and motorcycles.

Were glad to see cattle in the area of Kane Hollow.

Were sad to see all the dead trees at East Park; increase the amount of trees taken from these areas so that new growth can be started.

Maintain deer and elk population so that hunting can be enjoyed.

Upgrade the fish also.

16. South Fork and North Fork is a family fishing area for small children; would like to see

new roads into park areas, more tables, large cement pad with roof for rain shelter; North Fork needs firewood by fires.

Need picnic table and toilets up Carter Military Road about where Pat Carroll Park is on map.

Logging trucks in past years are highly dangerous in this area - Dry Fork [outside of Trout Slope].

Could use picnic tables at the fork in road in the Massey Ranch Area [outside of Trout Slope].

17. As a whole, in my 31 years use of this area, most of the changes have enhanced the useability of this area and for the present I see no need for any great changes. Believe strongly in multiple use and cooperation of all involved - users, managers (Forest Service), Fish and Game. It can continue to be a win-win if all work together. Livestock, recreation (winter & summer), hunting, fishing, campers, bikers, skiers, timber, firewood cutting. Also think it should be managed by local area people, not by groups from outside the area. Certain areas will be impacted with increased use, but by team effort it can be kept to acceptable limits.

18. Enjoyed the pristine conditions of the area when we first came (25 years ago) and would like them to continue as long as possible - knowing they are affected by beetle, more people, etc.

Use area for hunting, fishing, camping, hiking, boating, forest and wildlife viewing.

Re-open and maintain a source of drinking water at the Kaler Hollow Campground spring.

Better clean-up of clear cut areas and reseeding of these areas.

Close off old logging roads to minimize erosion and destruction by 4 wheelers; reseed if possible.

Enforce and control of logging trucks (speed and hogging the road).

Like to see more selective cutting over clearcutting to preserve wildlife habitat, water quality, and forest beauty.

Restrict and enforce ATV use to existing trails and roads designated for their use - not campgrounds and surrounding forest areas.

19. Seek recreational opportunities centered on wildlife, whether hunting, fishing, photographing or simply viewing. These activities take place on foot, skis, horseback, bicycle, boat, ATV, snowmobile, or road vehicle. All other uses should be secondary to the needs of wildlife. e.g. any future lumbering need to be done to improve wildlife habitat. Cannot imagine how mining would benefit wildlife, but it could be done with proper mitigation at another site.

Need to do ongoing education of the public regarding wildlife needs, how roads are detrimental to wildlife (large animals), why certain restrictions are necessary. This will be more and more true as population growth increases pressure on recreational resources. Increasing public use will probably need to be concentrated into areas that are already relatively highly impacted so as not to affect more wildlife habitat than is currently affected. e.g. select one of the water impoundments (East Park) for intensive development while others are left as is or made more primitive.

As one moves closer to High Uintas Wilderness, rec sites should become more primitive and further apart.

Examine possibility of reintroducing species extirpated from this area.

Proper outdoor experience means not seeing cattle, sheep or structures designed to manage these animals. Grazing should be phased out in most areas where people recreate.

20. Tremendous amount of dead timber could be used for firewood (eastside Little Brush Ck in Roundpark area). Make a road across the creek and close it after the timber is cut out. Would like to see other similar areas systematically opened up to remove dead timber before a major forest fire simply burns it up.

Opposed to any further restrictions on taking horses into the High Uintas; fine with regulations at the moment. This is a traditional family recreational opportunity I would like to continue. [Outside TS area]

Would like to see continued planting of rainbow and brookie trout in the lakes and streams of the area

Am extremely pleased with the way the area has been timbered commercially. It has enhanced the wildlife in the area and provided jobs for the private sector at the same time.

Like the temporary use of roads and when the need ends, they are locked with a gate. Think that is a better way to handle roads than tearing them up.

Like the policy of livestock grazing; see nothing wrong with using the grass there to produce beef and wool.

Forest should help locate and bring into existence additional water storage for municipal use and agricultural use.

21. Much of the area seems overharvested for timber. Slash piles and other signs of logging are visible in many locations. Visually, the area is often not very appealing due to logging and dense thickets of lodgepole.

The area is the gateway to the eastern High Uintas and is critical for recreation. Keep it accessible and open to dispersed camping.

It appears the area could be more intensely managed for wildlife. Restore habitat (use methods such as controlled burns).

Maintain high water quality.

Keep limited areas for xc skiing only.

Horse packing is a reasonable use of trails, but not on every trail.

22. Selective cutting instead of clearcutting; reseed areas that are cut; better clean-up after cutting

Close off roads when lumbering is finished and allow roads to grow back into former condition.

Better control on speed of ATVs; stay on authorized trails.

More control of speed with lumber trucks and other vehicles on the narrow roads; improvement of road Red Cloud Loop and road going off into Oaks Park; improvement on road at Oaks Parks Summer Homes.

Prevent overgrazing of livestock; make sure livestock is out by hunting season.

23. Protect wildlife habitat, leave uncut timber alone.

24. Recognize that all elevations, management areas, land types, and lifeforms are intimately related in an exquisitely beautiful and complex ecological continuum. [scope, scale of focus]

Make timber production secondary to other resource considerations - managing around timber targets is neither good science nor good economics.

Some timber sales benefit some wildlife populations; but attaining silvicultural health over an entire forest is not only impossible, but undesirable from and ecologic standpoint. Realize the disparity between forest health from the traditional silviculture standpoint and normal healthy ecology of certain forest types; realize that in lodgepole pine systems the timber base fluctuates broadly through the years based upon normal cyclical mortality in the system; no amount of timber cutting, salvage logging or other aggressive strategies will eliminate, or even successfully control dwarf mistletoe or the mountain pine beetle.

Suggest Ashley put timber production on equal footing with other resources.

Don't manage for increased forage for game animals or livestock.

Do manage for perpetuation of natural cycles in the forest ecosystem.

Encourage not to allow or promote any further incursions into unroaded areas in the quest for

timber; Specifically, curtail salvage logging where it involves road building in currently unroaded areas.

Do close as many logging roads as possible.

Stands of mature lodgepole should be retained; Prescribe logging in all pothole country; do not harvest green lodgepole pine.

Lodgepole forest from Frenches Park to Galloway Corral should be included in the analysis area, they are part of a large, contiguous, unbroken belt of climax green lodgepole forest on the eastern end of the mountain range; similar vegetative community.

Study previously logged-over areas for type and percent of regeneration, cumulative effects of proximate sales (effects of road building, cover reduction, and wildlife habitat manipulation on wildlife populations; effect of wildfire on these same resources).

Undertake riparian restoration where problems are occurring or could occur

South Fork of Ashley Creek from its origin through Ashley Gorge has been formally proposed as a candidate Wild and Scenic River by Utah Rivers Conservation Council; develop a management plan that will preserve its candidate qualities and essential nature in perpetuity. [This group has done an individual assessment of the stream and published a document summarizing their findings, but there is no procedure for citizens to formally propose W & S rivers, and they have not made a proposal to the Ashley. Assume this is out of context.]

A balance of motorized and non-motorized recreational opportunities should be preserved.

Look at the need for "hardening" and landscaping some intensively used recreation sites with permanent toilets, trash disposal and well drained camp trailer parking sites. These needn't be designated as "campgrounds", just sites traditionally "hammered" by family groups, reunions. Determine whether there actually <u>is</u> a problem.

Consider opportunities for recreation uses in all seasons.

Enhance hiking and mountain biking while protecting other resources. Opportunities for more non-motorized winter sports and more yurts.

Opportunities for cost/labor share partnerships for recreation enhancement or to mitigate impacts of increased recreation use.

Planned burns and conditional "let burn" could be used to restore role of fire in lodgepole pine forest ecology.

Manage for biodiversity and preservation of adequate habitat for non-game as well as game animals.

Migration corridors should be maintained and enhanced if need be. Road closures and curtailing road building may be useful tools in some cases.

Opportunities for introduction of once common indigenous species; habitat enhancement projects.

Inventory and monitor amphibian populations as indicator of riparian health, water quality, and general ecosystem health.

Special plant associations should be preserved, e.g. limestone outcrops/aspen-prostrate juniper; willow/sedge community.

25. No comments at this time.

26. Strongly supports multiple use.

Disagree with Forest Service past record of closing old trails to motorized travel, preventing access to older and handicapped citizenry. More road access should be provided as population increases, not road closures. When a timber road is built, keep it open for multiple use.

I feel the forest is almost a police state.

27. Maintain minimum of open roads, enforce closures. Obliterate first 100 yards off main road to help administer gate closures on roads planned for later entry or fire suppression.

Maintain cover, stagger entries by compartment. If trees are going to be down and dead, no sense talking maintenance.

Don't raise the stocking rate due to transitional forage production, be careful what is done with regeneration.

Clearcut aspen where it is about to be lost.

28. No comments.

ANALYSIS OF COMMENTS RECEIVED

Comments were placed into 6 regions of apparently similar focus. Each region had comments further categorized by issue. Many comments could apply to or affect other regions or issues; many issues could have a bearing on other issues. mc 8/29/95

I. The Surrounding Region (18 comments)

A. The general management environment/approach/philosophy. (16 comments)
1. Comments on a spectrum ranging from strongly supporting multiple use (with an anthropocentric emphasis) to emphasizing ecological, natural processes (but not expressing exclusion of human activities).

B. Scope/Area of the Assessment (2 comments)
1. Recommendations to expand the assessment at different scales - forest-wide, watershed by watershed, lodgepole pine forest type.

II. Wildlife (21 comments)

A. General Habitat Management. (7 comments)
1. Restore, intensively manage for, or protect wildlife habitat for all species (4 comments).
2. Reintroduce extirpated species (2 comments); do not introduce exotic species (1 comment).

B. Big Game Management. (6 comments)
1. Specific recommendations to maintain or enhance big game habitat: corridors, cover, roads, forage, hunting (5 comments).
2. Decrease the elk population size to protect vegetation in logged areas (1 comment).

C. Fish. (5 comments)
1. Specific recommendations to protect/enhance fish populations (4 comments).
2. Study amphibians to guide riparian management (1 comment).

D. Predator Control. (2 comments)
1. Use non-lethal means or abandon predator control except in certain instances.

E. Goshawks. (1 comment)
1. "Goshawks need mature forests."

III. Recreation (18 comments)

A. Opportunities for Management. (20 comments)
1. Area's importance for recreation in general expressed (5 comments).
2. Values of the area for a range of specific pursuits/experiences expressed - motorized to non-motorized activities, visual quality (10 comments).

3. Recommendations for future recreation management: focus on wildlife as the attraction (3 comments); use volunteer help for maintenance and improvements (1 comment); focus on opportunities for recreation use in all seasons (1 comment).

B. Access and Travel Management. (34 comments)
1. Generally keep the area accessible for motorized and non-motorized opportunities (3 comments)
2. Safety concerns related to some road conditions and logging truck traffic (5 comments).
3. Recommendations on trails and roads cover the spectrum relatively equally ranging from more motorized emphasis (and more lesser-abled access) to more non-motorized emphasis in all seasons. No recommendations to entirely exclude one type of access/use but many point to need for harmonizing and balancing the variety and amount of uses (26 comments).

C. Developments, Improvements. (10 comments)
1. Site specific recommendations on additional permanent facilities - tables, toilets, shelters, etc. (6 comments).
2. Develop no new permanent facilities to avoid fees, maintain primitive experience (4 comments).

IV. Trees and Timber. (29 comments)

A. General Timber Management. (5 comments)
1. Perpetuate fire-adapted and special plant communities (2 comments).
2. Concern about certain effects of timber harvest on water yield, wildlife habitat, and visual quality. (3 comments)

B. Timber Harvesting. (24 comments)
1. Equally polarized specific recommendations to do more and do less timber harvesting (15 comments).
2. Do timber harvest differently without a mention of how much is done - selective cuts, improve visual appearance, ecological integrity vs silvicultural health (9 comments).

V. Ground Vegetation. (12 comments)

A. General Ground Vegetation Management. (4 comments)
1. Perpetuate fire-adapted and other special plant communities (2 comments).
2. Manage vegetation for non-commodity, multiple benefits - soil protection, wildlife, fire spread (1 comment).
3. Manage against an increase in forage for wildlife or livestock (1 comment).

B. Livestock Grazing. (8 comments)
1. Continue carefully managed livestock grazing (5 comments)
2. Curtail grazing when/ where there is a conflict with recreation (3 comments).

VI. Water. (5 comments)

1. Protect water quality (3 comments).
2. Provide more water storage for municipal and agricultural use.
3. Manage South Fork of Ashley Creek as a Wild and Scenic River.

APPENDIX 2

Additional References - Existing Condition

Cultural Resources
Livestock Grazing Allotments

CULTURAL RESOURCES

The Trout Slope Landscape Assessment area is rich in cultural resources. The land was used by prehistoric inhabitants who left their mark in the form of lithic scatters, and later by historic miners and millers whose structures and roads are standing reminders of the activities that took place here during the last century. The interpretation of these different archaeological sites helps us understand how the activities of the past have shaped the landscape to what it is today.

Prehistory

About 8,000 years ago, Archaic peoples roamed this land. Hunting game and harvesting plant foods, they lived for thousands of years with very few changes. By AD 400 enough major changes had been made for archaeologists to define them as the Fremont culture. The Fremont are marked by a switch from hunting with atlatls to using bows and arrows. Although we have yet to find artifacts in the Trout Slope area that are definitely dated to the Fremont, we suspect that they used this land as they used other lands on the Forest. The
Fremont disappeared around 1300 AD, and were replaced by Numic groups such as the Ute and Shoshone who remained in the area into historic times.

While lithic debitage is the most common artifact type found in prehistoric sites in the area, it alone cannot be dated. Besides one lithic scatter with many tools, probably indicating a kill site, Trout Slope has yielded a rare site containing pottery sherds that have been classified as Shoshonean Brownware. Ceramic vessels of the Shoshone are distinct in characteristics that make them identifiable. Most of the vessels are jars with flat, round and pointed bases (Butler 1983:14). In addition, these wares are tempered with grit, sand, or crushed rock, as well as quartz fragments. The surface textures vary from rough to smooth and the color ranges from gray to brown (Butler 1983:16).

We suspect that there are more prehistoric sites in the Trout Slope area that have yet to be recorded. The location of more sites and dateable artifacts will help us understand how prehistoric people used this area, and how the area relates to the general prehistory of the entire Forest and the Uinta Mountains.

This paper will now focus on the historic activity that took place here. The Trout Slope area was used extensively by historic people, and contains some very important historic sites, including an early mining district, evidence of early logging activity, and two of the earliest roads to cross the Uinta Mountains.

History

Mining activity was extensive between 1880 and 1900 in the Trout Slope area. The most productive and famous mine was the Dyer Copper Mine. Although the Dyer Mine and its smelter are located on private land, the Dyer Mine Historic District encompasses sites on the Forest, such as an old road and mining camps. The history of the Dyer Mine is pertinent to the understanding of these historic sites on the Forest.

The Dyer Mine

In 1880, interests in the mining aspects on the mountain were at a high pitch. Mining companies, corporations, districts, and partnerships were made and dissolved almost daily. One interesting meeting occurred on June 4, 1880 at what was called "Vortex Cave" and which may be what we now call Big Brush Creek Cave. The Carbonite Mining District was organized at this time.

The little town of Bullionville was founded at the Carbonite Mining District in anticipation of a large gold-producing mine. Although little gold was found, the Dyer Group mines produced good copper ore. In 1899 a small mill and smelter were built around the mine. All ore 10 - 40% copper was smelted and the ore of 50% was shipped directly. Most ore and bullion was saved during the summer and then hauled to the railroad during winter. It was easier for the draft animals to drag the copper in sleds on the packed down snow, than in wagons along the rugged roads.

Thompson's book, Some Dreams Die, Utah's Ghost Towns and Last Treasures, claims that an Indian named Dick Murdock found the Dyer mine and sold it to Lewis Dyer. An article written by A.R. Morrill states, "A Mr. Dyer from the East acquired knowledge of the ore pocket deposits back on Brush Creek mountain and after filing his claim, started operation about 1886."

The Dyer Mine operated from 1887 to 1900 producing over $3 million worth of high grade copper. The ore was shipped to the railroad at Carter, WY and to the Marsac Mill at Park City, 150 miles by wagon road across the Ute Reservation. More than 100 miners and their families had lived there at its peak, and an additional 30 families lived at the smelter site 2 miles northwest on Anderson Creek. In 1893 the Dyer Mine shut down due to the low price of silver and copper. In 1897 the mine foreclosed. Then in August 1900 the smelter started up again under Mr. Sawyer who was an experienced man. He put on a force of 30 men at the old location and put on 25 more at the new location. By 1901 the main vein was used up and most mining activity stopped. Only a handful of men worked until 1920 when the mine shut down for good. In the early 1930s the town was reoccupied as a Civilian Conservation Corps Center.

Sites

There are at least 6 historic mining camps in the Trout Slope area which are proof of the many years spent in the Uintas extracting minerals. Parson City was a mining camp used when Dyer Mine first started. The dates estimated for its use are 1887 - 1920. The site consists of at least 3 log cabins plus a 2 seater outhouse. The site was probably associated with the various mining activities and may be related to the Dyer Mines. The Grizzly Ridge Mine consists of a mining cabin with two mine shafts. Galena and some traces of silver indicate that the location was probably mined for silver. This site was used as a mining camp from as early as 1878 through the late 1950s.

Along the Dyer Mines road is a site which consists of the cabin remains of a mining camp. Two cabins are less than 30% of their original state. Two other cabin foundations are visible.

The site is associated with the copper mining and opened in 1878.

There is another Dyer Mine camp just south of the Dyer Mines. The estimated dates for this site are 1887 - 1920. There are 11 cabins here as well as a mine shaft and a root cellar. Another cabin site and mining area also date to the same era.

Timber

Logging on the Forest began in 1877 and was initially for local use only. Many of the sawmill and cabin sites from this era of logging are still standing. They are scattered about the Trout Slope area forming an historic district intermixed with the mining activity. Although some of these timber related sites are not much more than a pile of sawdust or some tin cans and glass, others are in much better shape. The following newspaper statements provide some history of some of the mills.

The sawmill in Windy Park was owned by George Bartlett and Gill Colton who began their work in 1889. The Government sawmill in Government Park was operated by Mr. Henry C. Ruple. There he sawed lumber for the construction of Ft. Thornburg which was established by the US Army.

There was also a sawmill in Oaks Park. In the summer of 1882 Hyrum Oaks and his son Martin began turning out shingles from Shingle Flat, now called Oaks Park. Eleven years later they purchased a sawmill from William Turner in Heber City and brought it to Oaks Park. After 14 years of turning out lumber, the mill was bought by H.C. Ruple in 1907 and moved to a location along the Green River. Then Dick Slaugh moved into the Oaks Park site and worked his mill there for an unknown length of time.

The Carter Military Road

One section of the Carter Military Road crosses the Trout Slope assessment area. This was the first road through the Uinta Mountains. The following history of this road helps provide a sense of all the activity which went on in the Trout Slope area.

In 1881, the Utah Territory still had only a small population, mostly scattered along the Wasatch Front in towns of orderly Mormon design. Heber City was the eastern edge of civilized territorial settlement, and it was a good two-day ride from the Wasatch Front. Almost no whites lived east of Heber City except a few sheepherders and cattlemen who trespassed on the large Ute reservation set aside by President Lincoln and Congress in the early 1860s.

Most of the Uinta Basin, Colorado Plateau, and the western half of Colorado were virtually unsettled by whites. This area of rich natural resources adequately supported several bands of Ute Indians. The whites, coveting these resources, began to encroach on the Utes' large range, leading to confrontations that became increasingly hostile.

At the White River Agency (now Meeker, Colorado), Ute bands became resentful of Indian Agent Nathan Meeker's attempts to reform them into an agriculturally- based society. Fearing for his life, Meeker sought assistance from the military in September of 1879. Major Thomas T. Thornburgh and a column of four companies were sent from Ft. Steele, Wyoming, to assist

Meeker. Upon entering the reservation the column was attacked by over seven hundred mounted Utes. Sixteen soldiers died, including Thornburgh, and forty-three were wounded. At the same time Meeker and ten other employees were killed at the agency. As a result of these skirmishes, the Ute bands involved and other bands--including Chief Ouray's Uncompaghres from western Colorado--were coerced onto the Utah reservation, joining Chief Tabiona's band from the Uinta Basin.

Ashley Valley residents were concerned about their safety after Custer's defeat in 1876, and the recent fighting in western Colorado. In 1881, Fort Thornburgh was established at the mouth of Ashley Canyon, just northwest of Vernal. The army's mission was to keep the Utes on the reservation. The fort's location was uncomfortably remote, given the recent bloodshed. It was several days march fro m Fort Douglas in Salt Lake City, and more from Denver or other help in Colorado. Only about one hundred white settlers lived in the Ashley Valley, mostly cattlemen attracted to the area by lush grazing lands on the flanks of the Uinta Mountains.

Judge Carter's Road

At Fort Bridger in southwest Wyoming, the entrepreneurial Judge William A. Carter had made a profitable career out of provisioning the army. Described by former Uintah County Historian Mike Brown as "the very image of the Southern gentleman," Carter had been raised in Virginia and fought Florida Indians in the Seminole War. When he did not receive a commission in the army he resigned and became post trader at Fort Lauderdale. In 1858, when Johnston's army was sent west to quell the "Mormon Rebellion," Carter accompanied the expedition as the civilian supplier.

Carter settled at Fort Bridger and quickly amassed a fortune trading with soldiers, emigrants, railroad builders, cattlemen, and Indians. In 1858, he was appointed post trader, post master, and probate judge. He also participated in mining, lumber, and cattle ventures.

Carter's business suffered after troops were removed from Fort Bridger in 1878. He used the growing fears of the local white population to lobby in Washington for a return of troops. Carter also hoped to continue and enhance his relationship with the army by supplying Fort Thornburgh. Carter was successful in his efforts. Troops returned to Fort Bridger and he was awarded a contract to supply Fort Thornburgh.

Construction Begins

During the summer of 1881, General George Crook inspected the old Lodgepole Trail across the Uinta Mountains that had been used by the Uinta Utes. Crook approved this route over an alternate trail as the supply route to the garrison at Fort Thornburgh. Routes from Park City and Heber City had been considered, but the route across the Uintas was chosen to accommodate Carter, and because it was the shortest, if not the easiest.

Minor work on the trail commenced immediately under Carter's direction. Judge Carter died of pneumonia in November, contracted from working on the road in harsh weather. His son, William Jr. (Willie), returned from Cornell University to continue his father's work. In May of 1882, Willie Carter attempted the first freighting across the trail with 22 six-mule teams and

wagons.

> "It soon became evident that from the character of the past winter at Fort Bridger, we had very erroneous conceptions of what we would encounter in attempting to freight through the mountains so early in the spring. The dugway between Sand Canyon and Lodgepole was blocked with snow and ice, which had to be removed before we could get our outfit up the mountain. At the head of the dugway the road was almost impassable. Ravines filled with melting snow and water nearly up to the wagon beds; bogs in which both teams and wagons were often mired down at the same time; hills so soft that all the teams we could hook on were often required to pull a single wagon to the top; the slopes so sidling that the whole crew, with ropes, were needed to keep a loaded wagon from upsetting; were everyday experiences."
>
> "... In one locality, a separate road had to be cut through the timber for each wagon. The ground at this place appeared dry and firm, but each wagon broke through a thin crust into quicksand beneath, making the road impassable for the next team."

In the summer of 1882, the army sent up work parties, but the primary commitment of the military to road building came in the summer of 1883. Four companies of troops were sent to develop the road under Major I. De Russey. The Major's detachment worked out of a field camp at Burnt Cabins, and it was this force that did most of the work we can now see. Their work consisted largely of corduroying (laying lodgepole logs across marshy sections), clearing large boulders, and constructing dugways (road cuts and fills). The troops also set up a sawmill in Summit Park to supply Fort Thornburgh, and a military telegraph line was strung along the route.

De Russey's force worked hard during the summer, and a review of the military records from the National Archive reveals that court martials were carried out almost weekly. Troops were fined several weeks pay for disorderly conduct, drunkenness, desertion and other offenses that indicate the difficulty of the work and lonely social conditions in this remote wilderness.

By 1883, it became clear that the route was a poor choice because of the high terrain and short season of travel. In addition, a Denver and Rio Grande Railroad route was completed, linking Salt Lake City and Denver through Price, Utah. Supplies could easily be wagon-freighted to the Ashley Valley from Price.

Fort Thornburgh was abandoned in 1884, and most of the durable items were hauled back to Fort Bridger. When Fort Duchesne was established in the summer of 1886, some materials were hauled back over the Carter Road, but most came from the new rail depot at Price.

Although, the military utility of the Carter Road ceased, it continued to be important to local inhabitants. The road was used to haul copper, gold, and silver ore from the Dyer Mine area during the last decade of the 1800s. It was the primary north-south wagon route from Daggett County to the Vernal area until the early 1920s, when a passenger car road was constructed

along the route of Utah Highway 44. Daggett County historians Dick and Vivian Dunham state that

> "While it [the Carter Road] was treacherous for heavy loads, hardy souls could at least get over to Ashley Valley in a buckboard to pick up honey and apples, then as now that district's specialties; or maybe take a sack or so of grain over to the grist mill to be ground into flour." In 1880, Ashley, (or Vernal, as it was called after 1885) became the main government seat. "So to Ashley or Vernal everybody had to go to file on land, pay taxes, get married, serve or answer writ, or any other official business. For these trips the old road came in mighty handy. It was used right up until 1924. Some adventurous souls even managed to get their Model T's part way over it."

In 1936, Willie Carter commented, "To the traveler who comes upon this road at any part of its course through the Uinta Range, it seems to present an unusual example of wasted effort and money, but like many other of the works of man, it served its purpose, and gave way to changes in the development of the country."

Dyer Mine Road

There is an old historic road which runs to the Dyer Mines which still has visible corduroy on it today. The road begins from Forest Road 18 and continues past the Dyer Smelter site to the Dyer Mines. It is marked by axe cut trees along the side. Parts of this road are still used today as Forest Road 35. As this road crosses Big Brush Creek there is a large clearing with evidence of logging. There are several pits and diversions near the creek as well some historic garbage such as cans and glass and machinery parts. Occasional tree carvings mark the years of travel along this old road.

Situated alongside the road just above Big Brush Creek is a small structure which has 3 trees growing inside of it. This structure is smaller than a cabin and is fairly incomplete. It is saddle notched, and we suspect it relates to the logging industry, as they used the road along with the miners.

Significance and Impacts

The historic sites found on the Trout Slope Landscape Assessment area are not all individually significant sites. However they are all significant in that they are a part of these logging and mining districts which are very important as they tell of a long history on this part of the Forest in the later 1800s and early 1900s.

These sites are fragile and vulnerable to the impacts of time and weather. They can also be damaged by many activities that take place on the Forest. Such activities which have the potential to damage cultural resources are logging, grazing, firewood harvest, hunting, camping, and fire.

Logging can be damaging to historic sites. Any trucks that drive through such sites can break artifacts on the ground. Also there is the potential for felled trees to land on structures, which

can break them or knock them down. However a large amount of beetle-killed timber poses risks to the cabins if they fall over.

Campers and hunters can impact the historic sites by sleeping in the cabins, building fires which can hurt the structures and by leaving their trash on top of the historic artifacts. We have had some cabins burn down in the past due to campfires.

Grazing can also hurt the historic structures. For example a cow could rub against a structure and knock it over or step on it. Cattle can also step on artifacts such as glass, moving them out of their important original context.

ATVs, snowmobiles and mountain bikes are also helping to destroy historic sites. The old roads can be torn up by these recreationists who drive right on top of the corduroy roads, breaking down the old logs.

The few known prehistoric sites we have in the area cannot be damaged by these activities because they are already so obliterated. One has been covered by the reservoir and the other is virtually gone due to the early collection. Other sites not yet identified could be impacted by grazing, recreation, logging and fire, however. Grazing can affect prehistoric lithic scatters. For example, when the cattle step on artifacts, they further push them into the soil or kick them around so they can be washed away to another location. If the site contains scarred trees or any structures, fire could destroy them. We do not yet know all of the impacts of grazing to prehistoric sites, however.

Sites on Trout Slope

State Site #	Site Type	Nat. Reg. Status	Cultural Affiliation
42 DA 208	Military	Significant	Euro/American
42 UN 510	Prehistoric	Non-significant	Shoshone
42 UN 562	Prehistoric	Non-significant	Unknown
42 UN 645	Logging	Significant	Euro/American
42 UN 827	Mining	Significant	Euro/American
42 UN 1307	Logging	Significant	Euro/American
42 UN 1413	Mining	Significant	Euro/American
42 UN 1414	Mining	Significant	Euro/American
42 UN 1415	Mining	Significant	Euro/American
42 UN 1416	Logging	Significant	Euro/American
42 UN 1435	Mining	Significant	Euro/American
42 UN 1438	Mining	Significant	Euro/American
42 UN 2238	Logging	Significant	Euro/American
42 UN 2239	Logging	Significant	Euro/American
42 UN 2240	Logging, mining	Significant	Euro/American

LIVESTOCK GRAZING ALLOTMENTS

Portions of nine range allotments are in the Trout Slope area: all of the Trout Creek allotment; nearly all of the Oaks Park allotment; and parts of the Lonesome Park, Big Park, Lakeshore Basin, Black Canyon, Taylor Mountain, Iron Springs, and Grizzly Ridge allotments.

TROUT CREEK ALLOTMENT: All of the Trout Creek allotment is in the Trout Slope area. It is comprised of lands in the AM, TS, PP, and SC LTAs. It includes parts of the Center Creek, Trout Creek, and North Fork of Ashley Creek drainages.

A three unit deferred rotation grazing system is prescribed in the current AMP (1981). Sheep are permitted to graze from July 6 to September 5 for a total of 620 AUMs. Range analysis for Trout Creek was done in 1994.

OAKS PARK ALLOTMENT: All but a small portion of this allotment is in the Trout Slope area. LTAs include TS, PP, LH, and SC. The current AMP (1981 analysis) prescribes a three unit deferred rotation grazing system, and sheep are permitted to graze from June 7 to September 5 for a total of 732 AUMs.

Partial or total non-use for range protection and convenience to the permittee has been approved for the last four years.

LONESOME PARK ALLOTMENT: The Lonesome Park allotment consists of the Dowd Mountain/Eagle Creek Unit, administered by the Flaming Gorge Ranger District, and the East Dyer Park Unit, administered by the Vernal Ranger District. Cattle are permitted to graze from June 20 to September 25 for a total of 1294 AUMs. The AMP (1990) prescribes a rest rotation grazing system where each unit receives two seasons of use followed by two seasons of rest. The East Dyer Park Unit was used in 1990-1991 and 1994-1995. This unit is almost entirely within the Trout Slope area.

LTAs included in the allotment are TS, PP, and LH. The important meadows in the area are: Kane Hollow, Little Brush Creek, Round Park, Dyer Park, Brush Park, East Park, Lake Park, and Big Park. Appendix 3F shows timber stands that serve as a barrier to livestock movement between the Oaks Park and Lonesome Park Allotments.

BIG PARK ALLOTMENT: About 72% of the Big Park allotment is in the Trout Slope area. LTAs include AM and TS. The allotment includes the headwaters of the North Fork of Ashley Creek and the head of the Deep Creek drainage.

The current AMP (1980) prescribes a four unit deferred rotation grazing system. Sheep are permitted to graze the allotment from June 16 to August 30 for a total of 563 AUMs. Range analysis was completed in 1994.

LAKESHORE BASIN ALLOTMENT: About 18% of the Lakeshore Basin Allotment is in the Trout Slope area. LTAs include AM and TS. The important meadows are Deer Park and Horseshoe Park.

The allotment has a long history of domestic sheep use but has been grazed only intermittently in recent years. The AMP (1980) prescribes a four unit rest rotation grazing system for 575 sheep AUMs. The grazing permit was waived back to the Forest Service in 1987. Use occurred under temporary permits in 1988 and 1989. No livestock grazing has occurred since that time.

An environmental analysis has been initiated to determine if the allotment should remain available for livestock grazing, be converted to recreational horse use, or remain vacant.

BLACK CANYON ALLOTMENT: The 16% of the Black Canyon Cattle Allotment within the Trout Slope area contains AM, TS, PP, and SC LTAs. Most of the area is forested but there is abundant forage in harvested areas and under bug-killed stands. This portion of the allotment does not contribute significantly to the carrying capacity of the whole allotment, however. Death of James Meadow is the only meadow occurring in the Trout Slope area.

The current AMP (1979) prescribes a five unit rest rotation grazing system, of which only portions of the Frenches Park Unit and North Brownie Unit are within the Trout Slope area. Two grazing permits are in effect. One permits cattle to graze from June 16 to October 15 and the other authorizes cattle to graze from July 1 to October 15. Permitted AUMs total 2023. A range analysis was performed in 1993.

Livestock control and excess livestock use have been problems historically on the allotment. In certain places, harvest of dense timber, which helped control livestock wandering, has contributed to the problems. Fencing is economically infeasible at this time.

TAYLOR MOUNTAIN ALLOTMENT: Cattle use has been managed on Taylor Mountain since establishment of the Forest Service in the area. Current management, as directed by a 1972 AMP and a 1981 addendum to the AMP, prescribes a six unit rest rotation grazing system. This allotment is well developed and the grazing system is working well. Nine grazing permits authorize grazing cattle and horses from June 1 to September 15 for a total of 3758 AUMs.

Only about 5% of this allotment is in the Trout Slope area. LTAs include TS, PP, LH, and SC.

IRON SPRINGS ALLOTMENT: About 75% of this allotment is in the Trout Slope area. LTAs are PP, LH, and SC. Iron Springs, a low elevation allotment, is used by sheep in conjunction with other high elevation allotments. It is generally used as a starting point before sheep are moved to the Big Park or Trout Creek allotments and as a place to gather in the fall.

A two unit deferred rotation grazing system is prescribed in the current AMP (1979). Sheep are permitted to graze from June 19 to July 9 and again from August 21 to September 2 for a

total of 425 AUMs. Range analysis was done in 1994.

GRIZZLY RIDGE ALLOTMENT: About 58% of the allotment is in the Trout Slope area. LTAs include PP and LH. Like Iron Springs, Grizzly Ridge is used prior to moving sheep to higher allotments and as a gathering area in the fall.

Sheep are permitted to graze from July 1 through September 10 for a total of 864 AUMs. The current AMP was approved in 1979. Range analysis completed in 1994 concluded that all vegetative communities are moving toward desired future rangeland condition.

APPENDIX 2A

Additional References - Desired Condition

Recreation

Proposed Future of Recreation on the
Trout Slope Landscape:

Desired Opportunities and Management Strategies

OVERVIEW

Forest Service recreation specialists and natural resource managers reviewed public comments, recreational use information, Forest Service recreation management plans and travel management plans, draft Uintah County General Plan, and the Ashley National Forest Plan to create descriptions of the desired recreation environment and key recreation management strategies for the Trout Slope area. Briefly, the Trout Slope landscape would continue to provide into the short-term future (next ten years) the recreational opportunities and patterns of use that have been available to visitors in the recent past. Only minor modifications of structures or changes of opportunities would be imposed when necessary to accommodate expected small increases in recreation demand or to correct site-specific resource problems. The area would continue to have the character of the "backyard forest playground" for Ashley Valley residents.

Below are more detailed descriptions of some recreation conditions believed to be most desired by the general public and most suited to the environmental conditions in the Trout Slope landscape. They are presented under headings of Developed Recreation Sites, Dispersed Recreation Uses, and Travel Opportunities. Feasibility of achieving these desired conditions is primarily dependent on level of future funding by Congress for recreation programs.

FUTURE SCENARIO FOR DEVELOPED RECREATION SITES. Includes campgrounds, picnic areas, and guard stations where permanent facilities exist and certain services are provided to attract people and provide elements of comfort and convenience, where concentrated constant use by many people is expected, and where regulation of use and activities is expected by users: Iron Springs CG, East Park CG, Oaks Park CG, Kaler Hollow CG, Trout Creek Guard Station, and Grizzly Ridge Yurt. Reference 1982 Developed Recreation Site Management Plan, Vernal RD.

- Number of developed campgrounds would not change though small scale expansion may be considered to meet expected small rises in demand for number, type and convenience of facilities (e.g. adding toilets, picnic tables, or a few campsites, or providing universal access facilities, or enlarging existing campsites, or extending water lines). Downsizing or downgrading of campground facilities or services is not anticipated.

- Structures and facilities at all sites would be maintained in safe, usable, environmentally sound condition with aesthetics and convenience being important secondary considerations. Improvements or upgrades would be done only when continued maintenance is impractical or uneconomical or when the improvement/upgrade results in some additional worthwhile benefit (gravelling a path or road improves access while lessening erosional impacts). Maintenance and improvements/upgrades on Trout Slope sites would compete with the needs of other sites across the Ashley National Forest. Examples of maintenance activities include but are not limited to: removal of hazard trees; maintenance of water systems; replacing tables, barrier logs, signs, etc.; cleaning and painting toilets; trash removal. Examples of improvement/enhancement activities include: modernizing toilets, tables and other facilities and structures; enhancing universal accessibility; gravelling or other surfacing over bare soil; and improving the water systems.

- Additional yurt(s) for use by winter and summer cross-country recreationists may be erected if cost-share arrangements are conducive.

- Trout Creek Guard Station would remain available for overnight rental by recreationists when not reserved by the Forest Service for administrative reasons.

- Foreground and distant views of forest landscapes outside of developed sites would be maintained or enhanced to provide a mostly natural appearing landscape where activities of man are not obvious to the casual observer except where impractical for reasons of visible timber harvest operations, public safety, resource protection, or ecological rehabilitation.

- Services provided by Forest Service employees such as campground hosts, recreation guards and law enforcement personnel would be maintained. Compliance with regulations on human occupancy and use would be enforced. Campground fees, guard station rental fees, and yurt rental fees may increase with changing economic conditions and mandates from Congress. Increased fees will be based on costs of meeting standards for visitor satisfaction.

- Monitoring of site conditions and recommendations for maintenance, improvements and rehabilitation would continue and would be included in site management plans. Potable water testing would continue.

FUTURE SCENARIO FOR DISPERSED RECREATION USES. Includes camping, fishing, hunting, picnicking, fuelwood gathering, and sight-seeing. Includes areas where concentrated and fairly frequent human use occurs and where few or no facilities are provided in a mostly roaded and modified setting: Iron Springs, Kane Hollow, Round Park, North Fork and South Fork of Ashley Creek, Trout Creek Park, Big Lake, East Park, Government Park, and Windy Park. Reference 1982 Dispersed Recreation Area Management Plan, Vernal RD.

- Basic approach to management of dispersed recreation within Trout Slope in the future would be that of allowing pursuit of any activities until intervention or control is necessary

to maintain standards for visitor satisfaction, protect the natural resources, provide public safety, or minimize substantial conflicts between users. Visits by Forest Service personnel would occur only when necessary to check compliance with federal regulations and Utah state standards in regards to occupancy and use of public lands, public safety, resource protection, sanitation, and fire prevention. Emphasis would be placed on seeing that visitors maintain a natural appearing and clean environment while affording maximum allowable freedom for individual recreational pursuits.

- Need is recognized to develop opportunities for new types of recreation but development of additional opportunities for currently occurring types of recreation may be considered. This stems from anticipated increase in visitation due to population increases in the Ashley Valley and the development of the Flaming Gorge/Uintas Scenic Byway on US Highway 191 east of the Trout Slope area which should attract additional tourists. At this time, there is a recognized need to meet increased demand for winter recreation (cross country skiing and snowmobiling) and dispersed camping.

- Quality and amount of backcountry, primitive type of experiences within Trout Slope is already rather limited but would continue to be provided to some degree away from main roads and the more popular areas. Backcountry, primitive opportunities are expected to diminish slowly over the next ten years as demand increases for family recreation related to motorized travel and easy access. Areas outside of Trout Slope are available and more suitable for primitive opportunities (such as Whiterocks River drainage, Lakeshore Basin, Mosby Mountain, and other areas further to the west and north of Trout Slope).

- Site plans would be designed for the most popular dispersed camping sites to attempt to meet demand while guarding against unacceptable resource impacts and use conflicts. These plans would identify impacts and problems associated with dispersed areas and would develop operation and maintenance standards and solutions to correct conditions. These plans may result in popular sites having more signing, and more improvements such as establishment and maintenance of access routes, site designation and hardening, and establishment of places for campfires, rustic designed toilets, central water systems that provide safe drinking water, and table placement. These plans may also identify and encourage use of substitute sites during correction/recovery activities on impacted sites.

- General plans for dispersed camping outside of the most popular dispersed camping sites will be developed. These plans will indicate potential substitute sites for existing popular sites, and minimal operation, maintenance and facilities needed to meet visitor satisfaction. Solitary dispersed camping opportunities will be identified, and no Forest Service management activities will be applied unless resource damage indicates such management is needed.

- To meet expected increase in demand for dispersed camping, additional sites may be identified and people would be directed to them. Some of these sites may include minor improvements such as proposed for popular, heavily used sites mentioned above.

- Dispersed recreation in the mostly roaded and modified forest setting would continue to mean that health and safety in these pursuits would primarily be the responsibility of forest visitors. "Pack it in - Pack it out" policy would remain in effect. No permits, no fees, and no reservations would be required (first come, first served) at dispersed camping and picnicking sites except in cases of large group activities (family reunions, company picnics, etc.).

- Fuelwood gathering for residential use (considered a dispersed recreation pursuit by the Forest Service) would continue to be an opportunity provided in Trout Slope at near historic levels. Currently there are only a few areas of a sensitive environmental nature that have fuelwood gathering restricted, and this situation is not expected to change much in the future. However, fuelwood is expected to become harder to come by as the most convenient source areas (those closest to town and main roads) are depleted first, leaving the sources that are farther away and more difficult to access available toward the end of the decade. Efforts will continue to make leftover wood from logging available as fuelwood where practical.

- Forest Service would continue to manage fish and wildlife habitat to provide opportunities for enjoyment of these resources through fishing, hunting and viewing by the public at near current levels. The Forest Service will work in concert with the Utah Division of Wildlife Resources and US Fish and Wildlife Service on issues pertaining to wildlife and fish management in Trout Slope.

- Foreground and distant views of forest landscapes outside of popular dispersed recreation sites would be maintained at a roaded natural or roaded modified appearing landscape where activities of man are somewhat obvious to the observer due to past visible timber operations, public safety activities, resource protection, and ecological rehabilitation.

FUTURE SCENARIO FOR TRAVEL OPPORTUNITIES. Includes travel on roads and trails and cross-country travel where no officially recognized routes exist. For trails, motorized and non-motorized opportunities for summer and winter recreational pursuits are addressed.

- Continue to allow public access and prepare for increased demand. Manage all travel to protect natural resources, provide for public safety, and minimize conflicts with other users (reference Forest Plan IV 14-16). Travel Management Plan updates would occur with public involvement when substantial needs for change to the existing situation are recognized. The current Travel Plan in effect for the Trout Slope area is the Vernal RD Travel Map of 1994. Emphasis items are: provide for the entire spectrum of travel opportunities - motorized to non-motorized, and harmonize the uses; guard public safety particularly related to condition of popular travel routes and routes where logging traffic and recreation traffic occur together (Red Cloud Loop, East Park to Trout Creek Road); expand winter ski and snowmobile travel opportunities. Recreation maps and signs will indicate that roads, trails and areas are closed to motorized use unless designated open, i.e. each road, trail, and area open to motorized use will be signed as open; if not signed as

open, the road, trail and area will be considered closed to motorized use. This policy is in compliance with State of Utah codes for motorized and non-motorized uses.

- Pack it in - pack it out", Tread Lightly, and Leave No Trace programs would continue to be promoted through public contacts and media. Forest Service personnel would monitor travel activities and resource impacts and check compliance with regulations.

- ***Unroaded*** areas open to unrestricted travel opportunities and all existing roads and trails would continue to be retained as long as they are needed for Forest Service management and public access though they may be closed seasonally, temporarily, or for indefinite periods to provide for public safety, to protect the road bed and reduce maintenance expenditures, or to protect wildlife habitat and other natural resources. Recurring road and trail maintenance and improvements would be done as funding allows. Maintenance needs within Trout Slope would compete with needs of other routes across the forest. There are current needs to develop and maintain trailheads, to increase trail and road maintenance and signing.

- Roads or trails may be permanently obliterated if they are not needed for administrative or recreational purposes or if they are causing unacceptable resource damage.

- Views of the foreground forest landscape from main roads [and the Highline Trail] would be maintained or enhanced to provide a mostly natural appearing landscape where activities of man are not obvious to the casual observer except where impractical for reasons of past and/or new timber harvest operations, public safety, resource protection, or ecological rehabilitation. Openings for viewing distant landscapes and for chances of seeing wildlife would be afforded where unique opportunities exist.

MEASURES OF SUCCESS/MONITORING RECOMMENDATIONS (use Meaningful Measures).

Standards for meeting visitor satisfaction will be established for existing developed recreation sites, dispersed recreation sites, trailheads and associated trails, and historic sites and features. These standards will describe all operation and maintenance actions and activities needed to fully meet the standards. Costs for meeting the standards will be developed. These costs will include backlog costs for facilities and conditions that have deteriorated over the years due to lack of funding, as well as costs for ongoing needs to maintain health and cleanliness, safety and security, good conditions of existing facilities, and a healthy ecosystem. In addition, costs of being responsive to ongoing and expected visitor requests for recreation information, i.e. signs, brochures, maps, etc., will be included. Annual monitoring will be done, through on-the-ground and mail surveys to assess the degree of compliance to standards and visitor expectations. This monitoring may result in revision of actions and activities for meeting the standards, or revision of the standards themselves.

APPENDIX 3

Sensitive Features

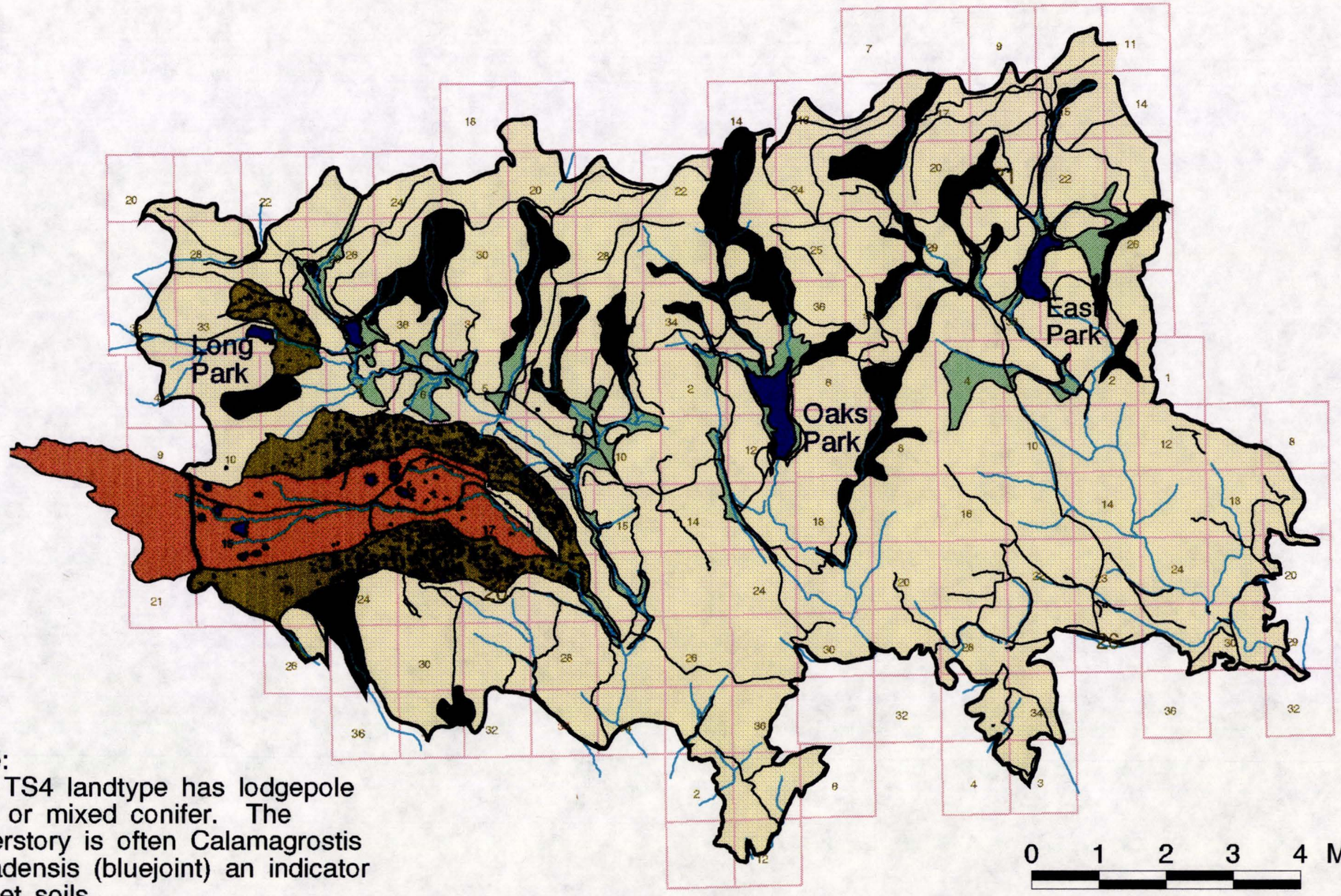
A. Riparian Areas
B. Goshawk Nests
C. Recreation Sites and Trails
D. Special Uses
E. Cultural Resources
F. Range Allotments and Landtype Grazing Values
G. Slope Map

NOTES:
Maps were provided on 8.5" x 14" paper for ease of incorporation into this document. Larger scale maps, with additional detail, are on file and/or can easily be produced from our GIS database to meet project planning needs.

Some maps show restricted information. They are not included in copies of this assessment provided for general distribution. See the responsible specialist if you need access to this information.

A. Riparian Areas

Map A: Riparian Landtypes in the Trout Slope Assessment Area



N

Legend

- Roads
- Streams
- Reservoirs

Riparian Landtypes

- AM1 - Potholes
- AM3 - Hummocky ground moraines
- TS4 - Forested riparian
- TS9 - Meadows

- Sections
- Trout Slope Assessment Area

Note:
The TS4 landtype has lodgepole pine or mixed conifer. The understory is often Calamagrostis canadensis (bluejoint) an indicator of wet soils.

0 1 2 3 4 Miles

Scale

4/10/96 co

B. Goshawk Nests

Maps of sensitive species locations by fire group and landtype are available
See Vernal District biologist (Kathy Paulin)

C. Recreation Sites and Trails

C1. Developed and Dispersed Recreation Sites

Developed Campgrounds
East Park
Oaks Park
Iron Springs
Kaler Hollow

Guard Station
Trout Creek

Cross-country Ski Hut
Grizzly Ridge Yurt

Dispersed Sites (H, M, L = hi, med, low use)	
Kane Hollow	H
Iron Springs North	H
Dyer/Round Park	L
Kaler CCC	L
Twin Parks	L
Oaks Park Undeveloped	M
Government Park	L
Trout Creek Meadow	L
North Fork Ashley Cr.	H
South Fork Ashley Cr.	H
Ox Park	L
Hacking Lake	L

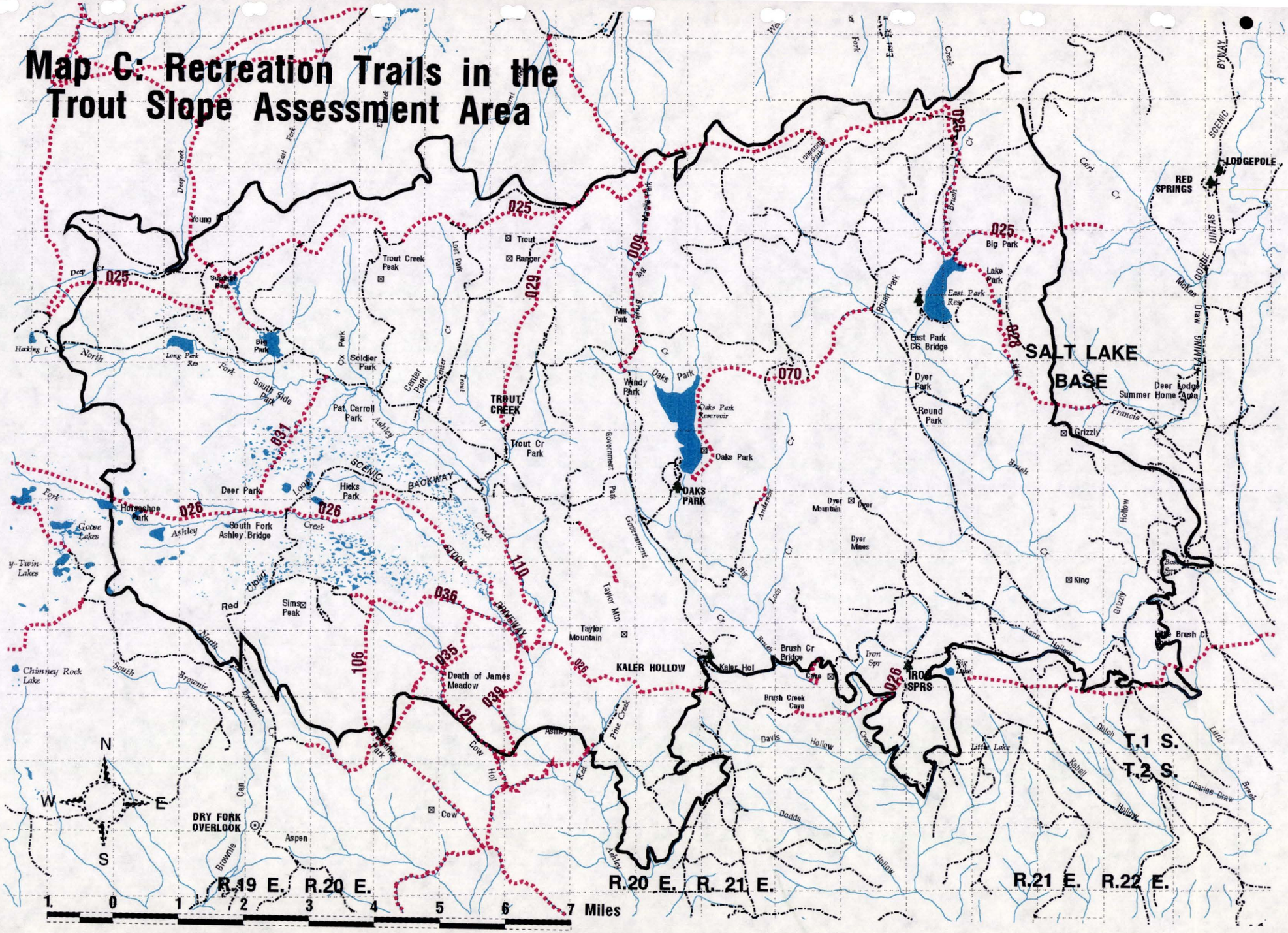
C2. Trails

Trail #	Trail Name	Opportunities					
		Hiking	Horse back	Mtn Bike	ATV	Motor cycle	Snomo
025	Highline	X	X	X	X*	X*	X
028	Lake Park	X	X	X	X	X	X
070	Oaks Park/East Park	X	X	X	X	X	X
009	Leona Spr./Manila Park	X	X	X	X**	X**	X
029	Trout Creek	X	X	X	X	X	X
031	Pat Carrol Park	X	X	X			X
026	Ashley Driveway	X	X	X	X	X	X
110	North Fork Ashley	X	X	X	X	X	X***
036	Cow Canyon	X	X	X			
035	Frenches Park	X	X	X			X
039	South Fork Ashley	X	X	X			X
106	Galloway Spring	X	X	X	X	X	X

* First 5 miles ** All but first mile *** Jeeps allowed on first mile; no jeeps on other trails

See map on following page for trail locations.

Map C: Recreation Trails in the Trout Slope Assessment Area



D. Special Uses

User #	Permit Holder	Permitted Improvements
1013	UT Div. of Wildlife Resources	East Park Reservoir, dike and dam
5260	Vincent Brothers	East Park Reservoir irrigation storage, diversion structure and pipeline
5140	Ashley Valley Reservoir Co.	Oaks Park Reservoir dam, canal and pipeline
5143	Ashley Valley Reservoir Co.	Long Park dam
5180	Highline Canal Co.	Highline Canal (Leidy Peak ditch)
5294	Highline Canal Co.	Deep Creek Canal and pipeline
--	various	Oaks Park Summer Homes (12)

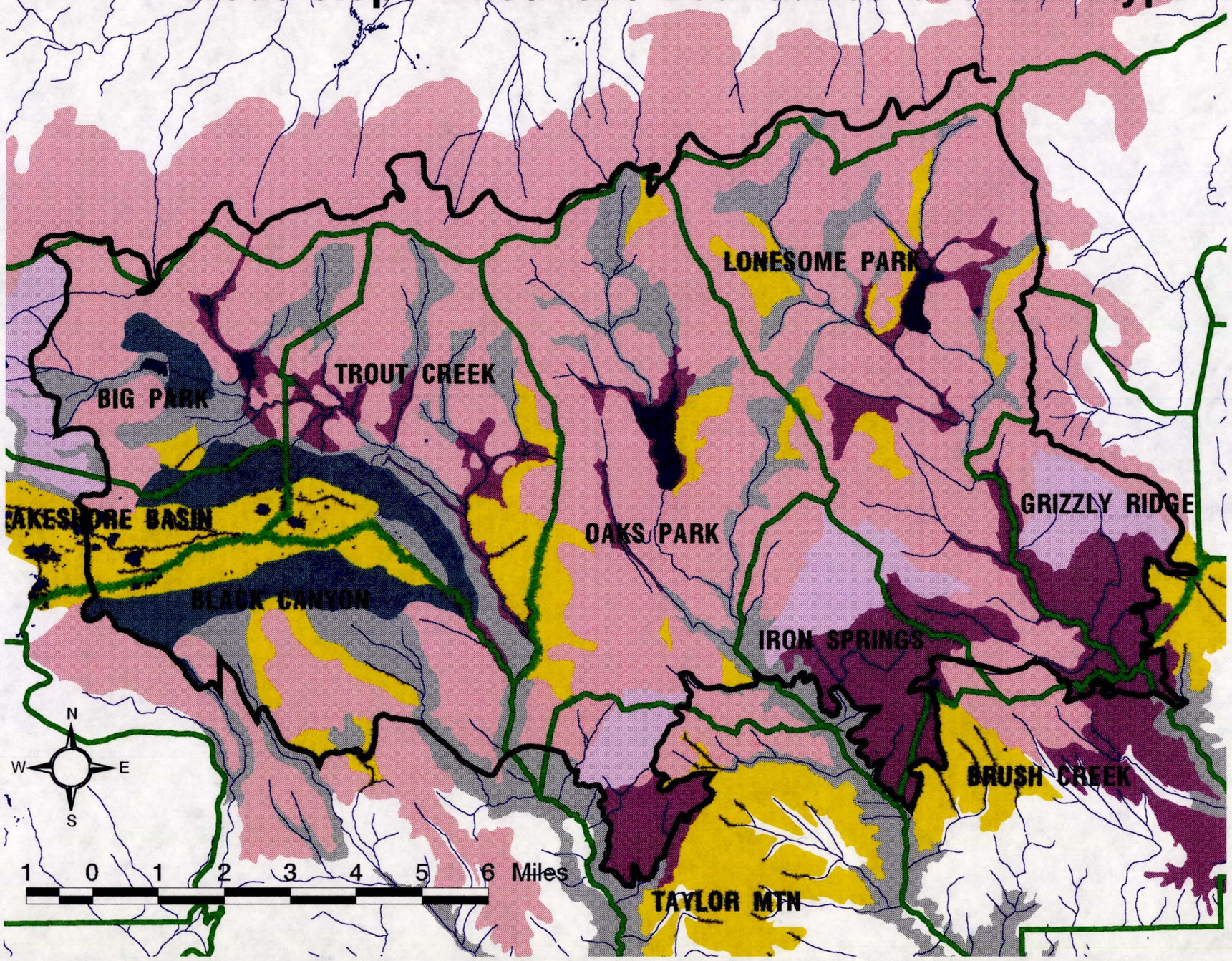
Improvement map on file at the Vernal Ranger District. Contact person: Mike Bergfeld

E. Cultural Resources

See the Forest Archeologist (Byron Loosle) for this map.

F. Range Allotments and Landtype Grazing Values

Trout Slope Allotment Boundaries and Landtype Grazing Values



Legend

Trout Slope Boundary

Allotment Boundary

Grazing Value

- Highest (8896 acres)
- High (11047 acres)
- Moderate (4103 acres)
- Medium Low (41727 acres)
- Low (10801 acres)
- Lowest (4036 acres)

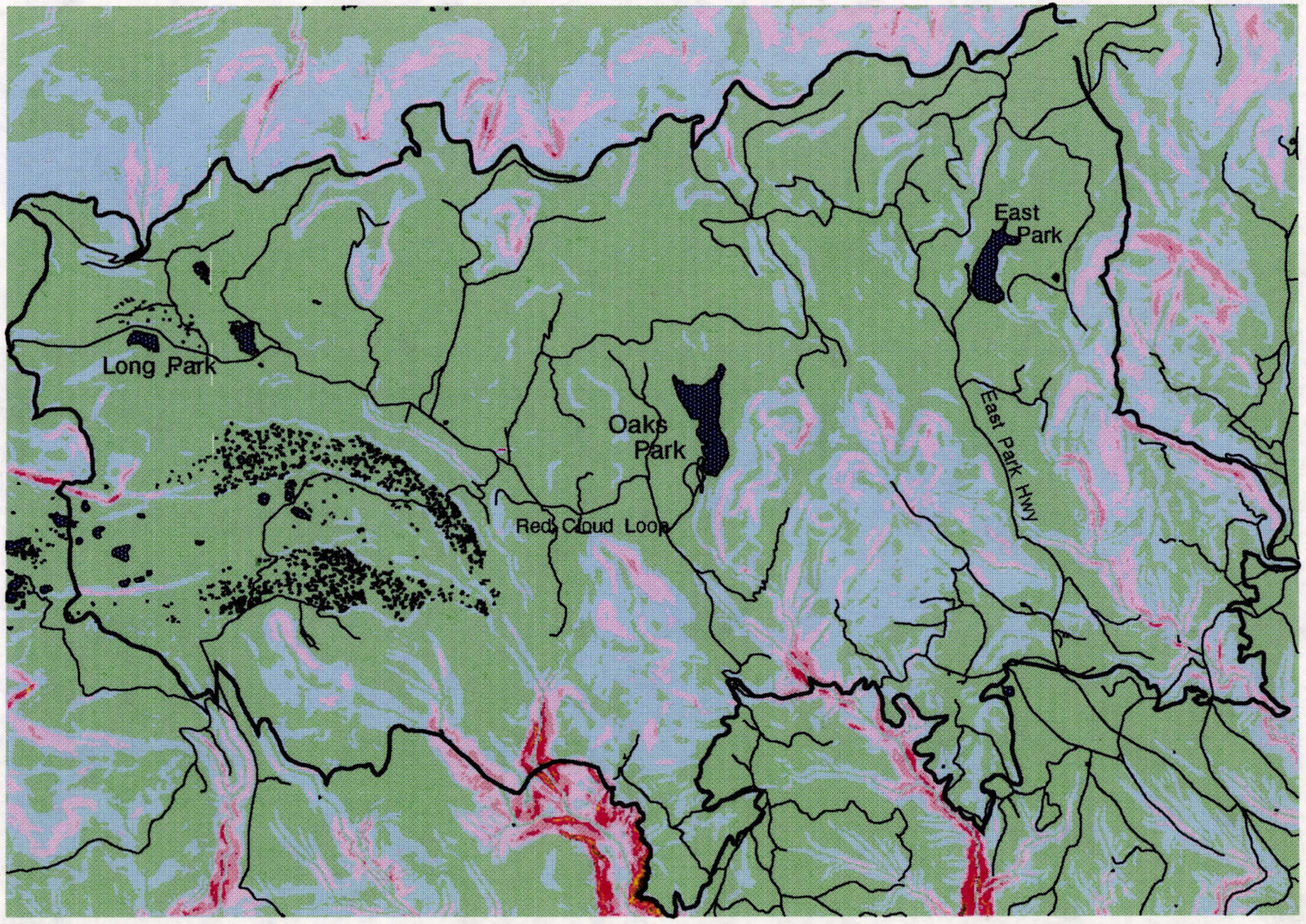
draft 3/5/96 JBB

Grazing values by landtype

Ltp	Value	Suitability	Production
AM02	Low	10% suitable	800-1000 lbs/ac
AM1	Lowest	10% suitable	<100-800 lbs/ac
AM2	Low	10% suitable	800-1000 lbs/ac
AM3	High	Dry Meadows	400-800 lbs/ac
AM82	Low	10% suitable	800-1000 lbs/ac
LH02	Highest	100% suitable	100-800 lbs/ac
LH02A	Highest	100% suitable	100-800 lbs/ac
LH02B	Highest	100% suitable	100-800 lbs/ac
LH02C	Highest	100% suitable	100-800 lbs/ac
LH02D	Highest	100% suitable	100-800 lbs/ac
LH02E	Highest	100% suitable	100-800 lbs/ac
LH02F	Highest	100% suitable	100-800 lbs/ac
LH1	Highest	90% suitable	100-800 lbs/ac
LH2	High	70% suitable	100-800 lbs/ac
LH3	Medium Low	30% suitable	100-600 lbs/ac
LH4	Moderate	40% suitable	500 lbs/ac
LH5	Moderate	40% suitable	500 lbs/ac
LH6	Moderate	40% suitable	500 lbs/ac
LH62A	Highest	100% suitable	100-800 lbs/ac
LH62B	Moderate	50% suitable	100-800 lbs/ac
PP1	Highest	100% suitable	200-1200 lbs/ac
PP3	High	>60% suitable	100-800 lbs/ac
PP4	Medium Low	Clear Cuts	<50-800 lbs/ac
PP42	Medium Low	Clear Cuts	<50-800 lbs/ac
PP5	Medium Low	25% suitable	300-700 lbs/ac
PP6	High	>60% suitable	100-800 lbs/ac
SC1	Low	10% suitable	400 lbs/ac
SC10	Low	<10% suitable	400 lbs/ac
SC3	Low	10% suitable	400 lbs/ac
SC4	Low	10% suitable	400 lbs/ac
SC5	Low	10% suitable	400 lbs/ac
SC6	Low	10% suitable	400 lbs/ac
SC7	Low	10% suitable	400 lbs/ac
SC8	Low	10% suitable	400 lbs/ac
SC82	Low	10% suitable	400 lbs/ac
SC9	Low	10% suitable	400 lbs/ac
SCO2B	Low	10% suitable	400 lbs/ac
TS02	Medium Low	20% suitable	200-400 lbs/ac
TS1	Medium Low	20% suitable	200-400 lbs/ac
TS10	Medium Low	20% suitable	200-400 lbs/ac
TS12	Medium Low	20% suitable	200-400 lbs/ac
TS2	Medium Low	20% suitable	200-400 lbs/ac
TS3	High	60% suitable	300-600 lbs/ac
TS4	Low	Provides little	
TS42	Low	Provides little	
TS5	High	>60% suitable	100-1200 lbs/ac
TS52	High	>60% suitable	100-1200 lbs/ac
TS6	Medium Low	15% suitable	200-1200 lbs/ac
TS8	Medium Low	25% suitable	100-800 lbs/ac
TS9	Highest	100% suitable	1100 lbs/ac
UB2	Low	10% suitable	800-1000 lbs/ac
UB3	Moderate	60% suitable	400 lbs/ac
UB6	Moderate	60% suitable	400 lbs/ac
AM5	Low	15% suitable	

Note: Where less than 100% of a landtype is listed as suitable, this does NOT mean the rest is unsuitable. The remainder may include non-range habitat types or areas of inherently low forage production which are suitable for livestock travel. See Godfrey et al. (1976) for more information on the ratings in this table.

G. Slope Map



Trout Slope Analysis Area
Slope Map
Appendix 3 Map G

N

Legend

- Trout Slope Area
- Lakes/Reservoirs
- Roads

Slope (percent)

- 0-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- 81-90
- 91-100

APPENDIX 4

Forest Vegetation Model

VSS-Based Forest Habitat Model
Background and Methods

Ashley National Forest
Forest Habitat Model
(aka The VSS Thing)

Introduction

The management recommendations for the northern goshawk in the southwestern U.S. (hereafter, the R3 recommendations; Reynolds et al. 1992) have been implemented to varying degrees on forests outside of the southwest. Inconsistencies in these applications have led to controversy. In particular, the literal application of quantitative elements of the recommendations on Forests outside of Region 3 has been legitimately questioned by local resource managers. On the Ashley, for example, few of our nest stands have all the structural attributes of suitable nesting habitat as defined in the recommendations, yet we see nest success rates which are comparable to those in the literature (including studies in the southwest; Kennedy and Dewey in prep.). We clearly needed to develop a locally appropriate interpretation of the recommendations which we could apply consistently across our Forest.

Initially, we thought of our adaptation of the R3 recommendations specifically as a goshawk management tool. However, as we worked with the process and gained an appreciation for the range of species and forest processes the R3 team had included in their work, we began to think of it in much broader terms. This same approach could be used to manage habitat for almost any forest-dependent species. To the extent that specific habitat information was available for other species of management interest (e.g. pine marten or flammulated owl), we could incorporate that information on an equal basis with goshawks and goshawk prey.

Later, when we looked at VSS as a way of describing existing and desired forest conditions in an interdisciplinary landscape assessment, we saw that it had utility for more than just wildlife. The desired VSS mix, and the size and arrangement of forest patches on the landscape, can be adapted to a variety of objectives (some examples are provided in the discussion of Step 3). Although we focus on wildlife in this document, we encourage project managers to consider other applications as well.

There were basically three steps to our adaptation of the R3 recommendations:

- define VSS classes appropriate to our tree species and growing conditions
- define desired percentages of each VSS based on local stand longevity
- define some guidelines for patch size and arrangement at the territory and landscape level

This document will describe how we approached each of these three steps. It will not repeat information presented in the original R3 publication; familiarity with that work is presumed (and is necessary to understand our adaptation). We will present some specific numbers that were developed for local use, but we do not mean to suggest that any of these numbers are applicable outside of the Uinta Mountains of northern Utah, any more than the R3 numbers are applicable to Utah or Idaho. They are only presented as examples of our thought process. To

develop a similar model for mapping and managing forest habitat in another geographic location, the three steps described here should be repeated with local data, and with consideration of local resource issues, objectives and species of interest.

This is an ongoing process. A number of universities and National Forests are working on habitat models, prey habitat descriptions, studies of environmental factors limiting goshawk production, and so on. Results of these studies (and of studies involving other forest species, such as pine marten) will need to be incorporated as they become available. The basic approach used in Steps 1 and 2 probably won't change, but the guidelines in Step 3 will certainly grow and be modified over time.

STEP 1: Defining VSS appropriately

VSS (vegetative structural stage) is a generalized description of the structural stages a stand passes through as it ages. Classification into one VSS or another is based on the diameter class containing the greatest basal area (Reynolds et al. 1992). The R3 recommendations divided stands into six stages, ranging from grass/forb to old forest. We sought to do the same for lodgepole forests (defined as those in which lodgepole and its precursor, aspen, contributed 80% or more of the total basal area), and for forests where lodgepole was codominant for long periods of time with Engelmann spruce and subalpine fir (referred to as mixed conifer forests in this document; in these cases lodgepole exists as a majority or plurality of the basal area stocking). These definitions are based on forest cover type descriptions developed by the Society of American Foresters for lodgepole (Type 218).

First, we considered what diameter represented a mature to old lodgepole pine, under good growing conditions. Using Alexander et al.'s (1983) estimate of a 200-300 year pathological age for lodgepole[1], we simulated growth via a computer model (FVS) and examined local stand data to establish the upper limits of lodgepole diameter classes on the Ashley. We then worked backwards from this "typical maximum" to describe six relatively equal size classes that spanned the development of lodgepole and mixed conifer stands from seedlings to old forest.

The result was two draft scenarios; one in which old forest began at 12" dbh, and one in which it began at 16" dbh. We used both scenarios to classify existing stands, and to classify computer simulated stands. The purpose of this exercise was to see which scenario was most realistic; specifically, to see how difficult it was to achieve old forest status (VSS 6) under each. Based on the results of this classification exercise, we subjectively determined that the 12" scenario best described the structural stages of lodgepole stands, but that mixed conifer structural stages were better represented by the 16" scenario (in part because of the contribution of spruce, which generally achieves larger diameters than lodgepole on this Forest). Definitions for each VSS under these two scenarios are as follows:

VSS	Description	Lodgepole definition	Mixed conifer definition
1	grass/forb	0" - 1" dbh	0" - 1" dbh
2	seedling/sapling	1" - 3" dbh	1" - 4" dbh
3	young forest	3" - 6" dbh	4" - 8" dbh
4	mid-aged forest	6" - 9" dbh	8" - 12" dbh
5	mature forest	9" - 12" dbh	12" - 16" dbh
6	old forest	12"+ dbh	16"+ dbh

[1]The 200-300 year rotation length was used solely to describe the diameters lodgepole was capable of achieving, given enough time. It is NOT a practical management rotation length on every lodgepole site. This was very apparent when we applied this model to a landscape with which we were familiar (and which had a history of pine beetle outbreaks and fire). Some sites on this landscape could not be expected to persist more than 120-150 years. We used fire groups as defined in Bradley et al. 1992 to develop practical management rotation lengths. See Step 2 for more information on using fire ecology to define desired vegetative conditions.

The diameters listed for old forests are NOT the largest trees we can expect to grow. They are simply starting points which will result in most chronologically old stands rating out as VSS 6. Remember that VSS is determined by the diameter class with the greatest basal area; there will have to be quite a few trees greater than 12" or 16" for this condition to be true. In practice, we will want to manage for the full range of tree diameters possible on a given site. This is important for both goshawk prey and overall diversity, since many wildlife species depend on larger trees for nesting or denning.

Old growth criteria are described for most intermountain forest types by Hamilton (1993). Engelmann spruce/subalpine fir and lodgepole pine are both discussed in detail; mixed conifer criteria can be inferred by averaging or selecting the most appropriate criteria from spruce and lodgepole, based on local conditions and management objectives. We did not require a stand to meet all these criteria before being classed as VSS 6. Instead, we incorporated them as an alternative to the basal area method. For example, if a stand rated out as VSS 5 on basal area, but met all the old growth criteria in Hamilton (1993), we "upgraded" it to VSS 6. Stands could also rate out as VSS 6 on basal area alone, even if some of the attributes listed in Hamilton (1993) were missing.

The only other rule we applied to individual stand classifications was a minimum basal area requirement. In order for a stand to be classified higher than VSS 1, there had to be at least 20 sq ft of basal area present (based on RMSTAND rules for calculating VSS; see page 60-75 of the RMSTAND User's Guide). This avoids classifying a clearcut with a few residual trees as a mature forest. The habitat values of thinned or partially cut stands, with basal areas greater than 20 but less than 100, is an issue that should be considered on a case-by-case basis. Low basal areas will decrease habitat suitability for some forest species, including goshawks.

STEP 2: Defining desired VSS mixes

Each of the structural stages described above has different habitat values for forest wildlife. Providing a mix of all stages results in a greater variety of prey for predators like the goshawk, and greater species richness and diversity at the landscape level. More importantly for forest-dependent wildlife, it is necessary to have all these stages present in order to provide a

steady supply of mature forest habitat over time (especially when the unmanaged forest would follow a more "boom and bust" pattern of habitat availability). Conversations with the authors of the R3 recommendations indicate that they were really making a set of recommendations for maintaining forest pattern, structure and processes, with emphasis on providing as much mid-aged to old forest as possible.

The R3 recommendations used a simple sustained yield model to prescribe the percentages of each VSS to manage for within goshawk home ranges. Basically, stand development was modelled over a specified rotation interval and the number of years it spent in each VSS was calculated. The proportion of the rotation spent in each VSS can be expressed as a percentage; e.g., VSS 3 = 20% if a stand spends 20 years of a 100 year rotation in VSS 3. Each VSS will account for a different percentage of the total rotation, due to differences in growth rates as the stand ages. This percentage corresponds to the proportion of the goshawk home range (or post-fledgling area, or management landscape) that should be in each VSS at any given time, in order to provide continual replacement of mature and old stands affected by insects, fire, harvest, etc.

This model was based on typical seedling establishment and growth rates at the stand level, and on a stand rotation interval inferred from average longevity of the dominant tree species. Since all of these things vary with management, the R3 recommendations provided VSS mixes for three different scenarios: minimal management (slowest development into large diameter classes), moderate management, and intensive management (fastest development into large diameter classes).

We repeated this process for lodgepole and mixed conifer stands on the Ashley, using the computer program FVS (Forest Vegetation Simulator) to predict stand structures[2]. In all cases, we assumed a moderate level of management (one precommercial thinning to 360 tpa when the trees were approximately 15 years old), average seedling densities (1500 tpa, based on data from 10% of the existing clearcuts), 0% slope, and a five year interval between harvest and establishment of new seedlings. Using these input variables, we modelled stand growth under several scenarios:

- 100% lodgepole pine at 8500' elevation
- 80% lodgepole, 15% Engelmann spruce, 5% subalpine fir at 9000' and 9500' elevation
- 60% lodgepole, 25% Engelmann spruce, 15% subalpine fir at 9500' and 10,000' elevation
- 50% lodgepole, 50% Engelmann spruce at 10,000' elevation

Increasing elevation without changing the tree species mix did not affect stand growth, so the duplicate runs of 80% lodgepole and 60% lodgepole were combined. However, changing the species mix did affect growth rates and stand structures, so we treated each mix as a separate forest type. Although the four mixes shown here were selected because they represented the range of conditions present in the Trout Slope Assessment area, they should apply equally well to lodgepole and mixed conifer forests throughout the eastern Uinta Mountains.

[2]Commands use to run each scenario in FVS are on file at the Vernal Ranger District.

FVS "grew" a stand under each scenario for 360 years, which is a longer rotation than we expect to see on most sites. We therefore had to cut off the model output for each scenario at a realistic rotation length. To help us make that decision, we compared each scenario to the fire groups described in Bradley et al. (1992). Pure lodgepole stands at 8500' elevation, for example, correspond to the habitat types listed as typical of Fire Group 8. Fire return intervals in this group are 50-200 years, so we chose a rotation length roughly mid-way through that range (120 years). At the other extreme, mixed conifer stands at 10,000' fit best in Fire Group 11, which has a fire return interval of 300 years or more (they rarely experience stand-replacing fire). We chose a management rotation length of 300 years for such stands. Rotation lengths for the other scenarios were derived in the same manner. Desired percentages of each VSS were then calculated as described above.

So far, all the calculations had been done at the stand level. To apply the desired VSS mix to a landscape, we needed to map out broad areas with relatively homogeneous forest types, then select the calculations most representative of that forest type. In the Trout Slope Landscape Assessment, we used landtype associations and fire groups to classify 68,000 acres on which lodgepole was common into the four forest categories we had modelled. We then developed separate desired condition descriptions, including rotation lengths and VSS mixes, for each category. This approach gave us realistic, defensible management objectives than were based on specific characteristics of the forest in each category. The results were as follows:

Forest type: Characteristic:	100% lodgepole at 8500'	80% lodgepole, 15% spruce, 5% fir at 9000-9500'	60-80% lodgepole, 15-25% spruce, 5-15% fir at 9500-10,000'	50% lodgepole, 50% spruce at 10,000'
Landtype Assoc.	Parks Plateau	Trout Slope	Trout Slope	Alpine Moraine
Fire Group	8	8	10	11
Rotation length	120 years	150 years	200 years	300 years
VSS 1/2	42%	27%	20%	10%
VSS 3	17%	13%	12%	17%
VSS 4a	33%	13%	16%	20%
VSS 4b		27%	12%	
VSS 5	8%	13%	18%	30%
VSS 6	0%	7%	22%	23%

Notes: The VSS mix shown for Fire Group 10 is a weighted average of the mixes for 60% and 80% lodgepole scenarios, where the weighting factor was acres of existing forest with greater or less than 80% lodgepole. This was done because of the variability in percent lodgepole across Fire Group 10 in the assessment area. See text for explanation of VSS 1/2, 4a and 4b.

We have no practical way of detecting VSS 2 stands with our current timber database. We typically do regeneration exams following harvest, then collect no further data until the stand is ready for thinning (usually VSS 3) or even later. We could probably predict VSS 2 stands based on years since harvest, but rather than introduce another step into this process (and another source of error) we decided to lump VSS 1 and 2 instead. It may make the VSS method of describing forest conditions more useful (e.g., for watershed models and big game cover maps) if we can find a way to split these two classes out in the future.

When we modelled stand growth for the 80% lodgepole scenario, we did not see a linear progression through the six VSS classes. Instead, these stands tended to progress to VSS 5, then cycle back into VSS 4 for several years, then grow back into 5 and finally 6. This appeared to be due to uneven growth rates toward the end of the rotation. Some trees grew into VSS 5 quickly, while other, slower-growing trees were left behind in VSS 4. Eventually the faster growing trees would be split between VSS 5 and 6, resulting in lower basal areas in each of these classes than was left in VSS 4 and causing the overall stand classification to drop back one stage. Eventually, the VSS 4 trees would catch up and the overall stand VSS would increase again.

The two stages of VSS 4 seen in this model (4a, with no trees present in the older VSS classes; and 4b, with some trees present in both VSS 5 and 6) seemed likely to have different habitat values for wildlife. We used goshawks to test this assumption, by collecting stand data at 45 goshawk nests and calculating the VSS for each nest stand. We found that 27 of 45 nests (60%) occurred in VSS 4b stands, while none were found in 4a stands. Based on this, we chose to treat 4a and 4b as a separate VSS. Where the model does not predict a VSS 4b, we still look for and classify such stands separately. Existing acreage in VSS 4b can be counted as (or managed to become) either VSS 4 or VSS 5 in these cases, depending on which class is currently deficit on the landscape.

Together, Steps 1 and 2 give us an effective tool for describing existing and desired forest conditions at the landscape level. In the Trout Slope Landscape Assessment, for example, we had stand exam data for 40-50% of the assessment area. We used this data to classify as many stands as possible according to Step 1. We then extrapolated from VSS mix in this 40-50% sample to a VSS mix for the whole assessment area. Acres in each VSS were summed by fire group and landtype association, as shown in the above table, and compared to the desired mix as defined by our sustained yield model. Differences between existing and desired percentages of each VSS were translated into management opportunities, and will be used to guide timber stand improvement and timber harvest projects. The sustained yield VSS mix also provides us with a tool for estimating timber volumes we will be able to offer in future years, which gives both the Forest Service and the local timber industry a chance to do some long-range planning.

This VSS approach is also proving helpful as a guide for timber salvage. We currently have a great deal of beetle killed lodgepole in the eastern Uintas, and are pursuing an active salvage program. Using existing stand exam data, we can classify individual stands into a VSS on the basis of total standing volume (the stand structure available to wildlife right now) and on the basis of the live volume only (the stand structure that we will be left with in 10-20 years, when the dead trees have fallen and/or been removed). When the stand VSS data is plotted over a large area, we can visually compare the current VSS mix to the future (live tree) mix. This lets us see where our next habitat shortages will be, both in terms of total available habitat and spatially (via GIS), and begin working now to compensate for them.

It is worth repeating that the above process for determining what percentages of each VSS are desirable on a landscape is based entirely on long-term sustainability, not on any predetermined objectives for old growth or harvest opportunities. The user chooses the rotation length, and the computer decides how much of each VSS can be provided. If more mature forest is desired, the rotation length can be increased and the model rerun; but only up to the maximum

rotation practical for the forest system being managed, given the dominant tree species and the disturbance ecology typical of the area. That's why there is little or no old growth forest in the mix for Fire Group 8. The return interval for insects and fire is so short that stands are unlikely to persist long enough to reach the upper diameter classes. If we were to make old growth a management objective in such a landscape, we'd be facing an uphill battle. We are better off managing for old growth habitats and species somewhere else (such as Fire Groups 10 and 11).

It's also worth repeating that applying a sustained yield model to a lodgepole pine dominated system is not a particularly "natural" approach. It's a compromise with the normal boom and bust ecology of lodgepole pine, designed to provide a somewhat more stable and predictable flow of goods, services, recreation opportunities and wildlife habitat than we would otherwise get from this forest system.

We currently have someone working on a computer program that can search RMSTAND for data on all stands in a specified geographic area, calculate VSS for each stand with data, and display the results as a VSS map using ArcView. The program runs from the Forest Service's new IBM computer system, with an electronic link to the old timber database on the Data General system. If we are successful in getting this program set up, it will be easy to apply this VSS process to any landscape of interest, from a 6000 acre goshawk home range to a subwatershed to management areas covering several watersheds.

STEP 3: Developing Implementation Guidelines

Once we know how much of each VSS we want, there are still many decisions to be made about the configuration of VSS patches on the landscape - e.g., what size each patch should be, and how they should be arranged.

Patch size has many implications for wildlife. Species-specific guidelines for opening and forest cover patch size exist for big game, flammulated owl, goshawk, pine marten and many more species of interest. At the ecosystem level, the positive relationship between overall species diversity and patch size is a basic tenet of ecology. Habitat fragmentation is therefore one of the main issues forest managers are struggling with right now. We've found the discussions and examples of how species/area relationships apply to forest management in Harris 1984, Hunter 1990, Morrison et al. 1992 and Primack 1993 useful; there are many other texts and articles on the subject available as well. Opening size also has implications for watershed integrity, fire management, and forest pest management.

Patch arrangement can also be a complicated issue. Factors such as viewsheds from campgrounds or popular roads, fire risk to high value sites such as summer homes or historic structures, cover values along big game migration corridors or in calving/fawning areas, sensitive plant habitats, thick timber that is used to help control livestock movements, or active goshawk territories all influence decisions about where to maintain late succession forest and where to place new openings. There will also differences in site potential that must be recognized - some sites regenerate well, others poorly; some sites can grow big trees, and others will never be very productive; some sites can grow stands with good nest stand attributes, but will probably never be used by a goshawk because they are on steep slopes.

This is the step where all these site-specific details need to be considered. Usually this will occur at the project level, in an integrated resource team environment (although some mid-scale planning projects have the potential to set site-specific objectives). Since implementation depends so much on local resource issues, capabilities, and management objectives, a discussion of this phase of the process must necessarily be general. Instead of prescribing specific guidelines, we offer the following examples of things to consider when working through the implementation process: (they sound like guidelines)

- Try to match patch size and fire ecology - create larger openings where fires tend to be large (e.g., lodgepole dominated forests) and smaller openings where fire is rarely stand replacing (e.g. moist subalpine forests where lodgepole is a plurality with spruce and fir).

- Consider the regeneration needs of the tree species you'd like or expect to get back following harvest. Lodgepole may need large openings; spruce/fir may do better in very small (0.5 or 1 acre) openings.

- Identify wildlife species to be featured in the landscape being analyzed and design patches around their needs. Since we can't maximize habitat for all species at the same time, make this a conscious choice and make it early in the process. The same is true for other resource areas - identify the issues and set the objectives early. Use the inherent capabilities of the landscape to help with the objectives - find out what the landscape is best at producing, and feature that if at all possible.

- List the sensitive or limiting factors (such as equivalent clearcut acre ceilings, soils that are sensitive to tractor logging, cultural resource sites, popular dispersed recreation sites, etc.) before developing project proposals to avoid conflicts later in the process.

- Plan for connectivity between patches of similar habitat. If there will be two large patches of mature to old forest in the landscape for pine marten, make sure there is a way for marten to get from one to the other.

- Identify features that are rare or unique in the landscape, and if they are important to achieving your management objectives, maintain or enhance them. This won't always be an unusual habitat type. In an intensively managed forest, a block of mature forest over a certain size may be a rare and valuable feature. Mature forest may also be valuable if it is associated with a big game migration route or active goshawk nest. If your landscape is a goshawk territory, current and replacement nest stands may need to be mapped first and patches of other VSSs filled in around them.

- Look for opportunities to manage insect and disease risk. We are accustomed to assessing and managing such risk at the stand level. However, any desired VSS mix that has a significant percentage of mature to old forest will involve managing for high risk stands. Is there a way to buffer these stands from one another, to reduce the extent or intensity of outbreaks to acceptable levels?

- Manage edge effects. Avoid creating forest patches that are all or mostly all edge (e.g., leave strips that are less than 6 tree lengths wide), since they will contribute to your desired

percentage of mature forest without actually providing any forest habitat. Edge effects can also be reduced by avoiding high contrast edges, such as clearcuts next to old growth stands.

This is obviously not a complete list; nor will all these things apply to every landscape. It's just meant to generate some ideas that might be helpful in other analyses. This will necessarily be a flexible, adaptive process. In fact, the ease with which it can be modified to apply to different locations and management objectives may be its best feature. The Ashley National Forest is currently trying all or parts of this process on two other mid-scale projects besides the Trout Slope Assessment mentioned here. We are still learning how to make it work, but so far it seems to be a helpful and practical tool. Any comments or suggestions on what we're doing, or insight from others who may be trying similar approaches, will be appreciated.

Authors

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Using VSS to develop desired condition statements and identify management opportunities: the Trout Slope Landscape Assessment Team, Vernal Ranger District, Ashley National Forest.

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APPENDIX 5

Existing clearcut area and an approach for determining allowable clearcut area by subwatershed

Approach for Determining Existing and Allowable Clearcut Area

Equivalent Clearcut Area (ECA) is an indicator of effects of increased water yield within a drainage. It is based on the principle that as vegetation is removed, evapotranspiration is reduced, resulting in increased runoff. Although this increase is viewed as favorable in an arid situation where demand often exceeds available surface water supply, increased magnitude and duration of peak runoff events can affect the stability of downstream channel reaches. Formula I (below) was developed in northern Idaho as a rapid means of determining a key guideline value in terms of ECA. The ECA value is the total area (in acres) within a drainage that is in an equivalent clearcut condition. An acceptable ECA is one for which the expected increase in average annual water yield is within the range in which the drainage channel will safely function. A standard for allowable ECA has been established in the Ashley National Forest Plan as a means of protecting stream reaches from the cumulative effects of increased water yield. For the drainages within the Trout Slope area, the ECA standard is 30% since the dominant stream channel conditions are good.

Formula I: $ECA = A(I)/F(R)$

where:
A = average annual water yield in %
I = prescribed increase limit for A
F = on-site water yield increase factor
R = average runoff for treated area in feet
A(I) = B = allowable or calculated water yield volume in acre-feet
DA = drainage area in acres

Existing ECAs for the Trout Slope assessment area are presented in Table 1 of this appendix. They range from 3% to 30%. All of the total ECA estimates by watershed are supported by timber stand data and are summarized in terms of VSS classes (Table 2, this appendix). These estimates take into account the approximate standing dead tree component (see evapotranspiration or "ET" adjustments in the individual subwatershed tables) and vegetative recovery (see recovery factors in Table 2).

The main watersheds in the assessment area are Dry Fork (0008), Ashley Creek (0009), and Brush Creek (0010). These watersheds are further subdivided by tributary areas (identified as subwatersheds; see map on following page). For example, 0008-3 is the designation for the Brownie Creek tributary of Dry Fork. Although none of the subwatersheds within the analysis area currently exceed the Forest Plan ECA standard, two existing ECAs are close enough to potentially limit future activities. Subwatershed 0010-2, West Fork of Little Brush Creek, is at 30% ECA and subwatershed 0010-3, Little Brush Creek in the East Park Reservoir area, is at 29%.

An estimate of water yield increase is also presented in Table 1. The increase in average annual water yield can be estimated as shown by Formula II (from Forest Hydrology II, Hydrologic Effects of Vegetation Manipulation):

Formula II $I = (ECA*R*F)/A$

where:
I = percent increase in average annual water yield due to vegetative manipulation
ECA = existing equivalent clearcut area in acres
R = average runoff of treated area in feet
F = on-site water yield increase factor in %
A = average annual water yield in acre-feet

assumption:
F = 0.35 (based on consideration of local soil types, precipitation patterns, climate and timber types

A paired watershed study in the upper Dry Fork drainage has provided us with data on water yield increases as a result of harvest and road construction activities. The drainage in which activity occurred (Brownie Creek) showed a 12% increase over the untreated watershed, the North Fork of Dry Fork. A review of stream channel condition in Brownie Creek revealed that overall, conditions have remained good in this drainage despite that increase.

Using 12% as the acceptable level of increase, allowable ECAs can be calculated for other subwatersheds with similar stream channel characteristics and landtypes. Allowable ECAs for subwatersheds with a higher percentage of sensitive stream reaches, or higher runoff curve numbers than those in the paired watershed study can also be calculated using an adjustment factor.

Applying this approach to subwatersheds in the Trout Slope assessment area results in site-specific allowable ECAs that vary somewhat from the generalized standard of 30% in the Forest Plan. The question of which approach to calculation of allowable ECA is most effective in maintaining watershed conditions and meeting water quality objectives is more appropriately addressed in future environmental analyses, using the NEPA process, than in this landscape assessment. Therefore, allowable ECA values for individual subwatersheds are not presented here.

Major Watersheds in the Trout Slope Assessment Area

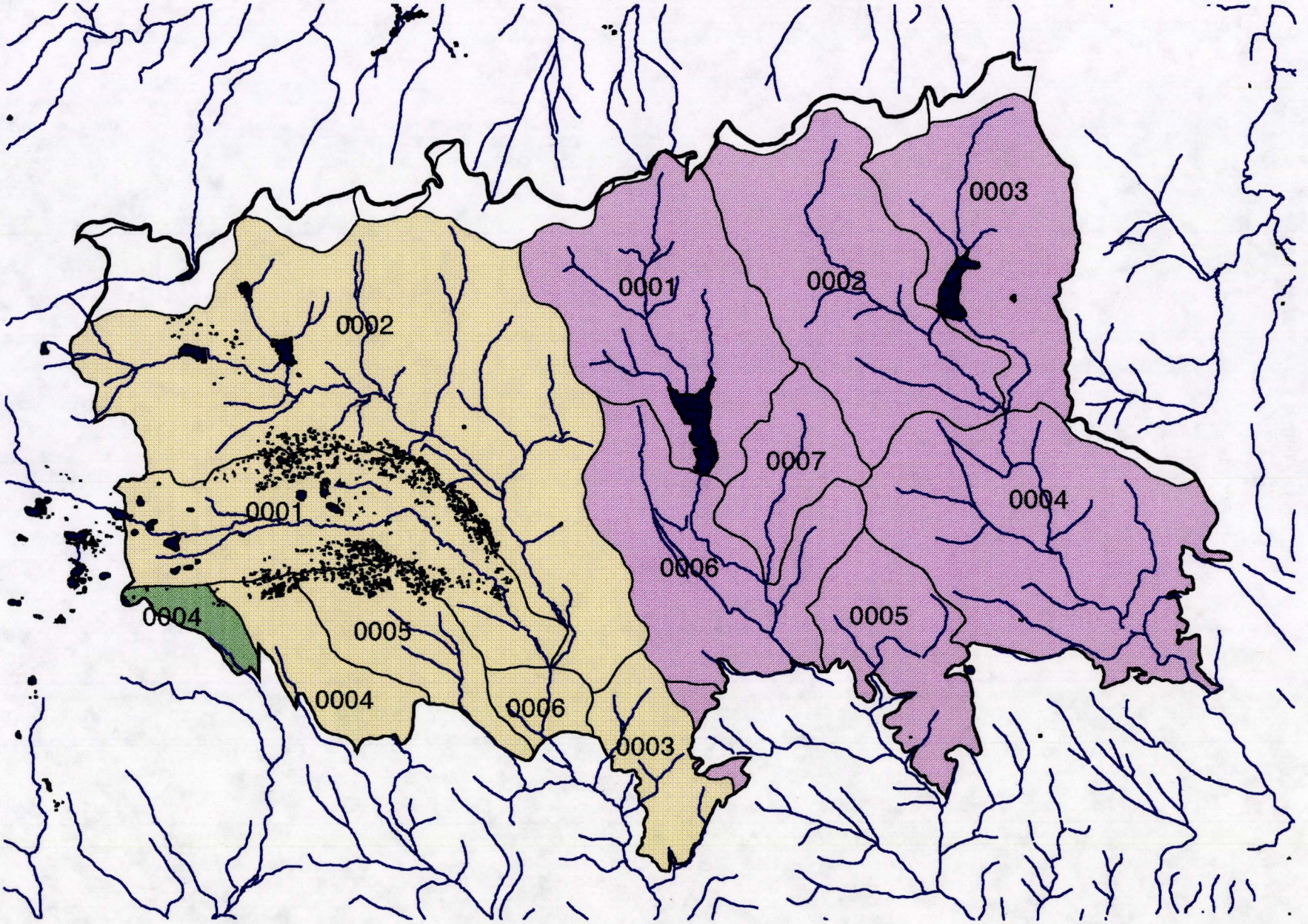

Table 1. Estimated Existing ECA

Water Yield Estimations for Trout Slope Landscape Analysis

Formula from Forest Hydrology II, Hydrologic Effects of Vegetation Manipulation

I = (ECA * R * F) / A

Where

I= Percent Increase in Average Annual Water Yield due to vegetative manipulation.
ECA = Existing equivalent clearcut area in acres.
R = Average runoff of treated area in feet.
F = On-site water yield increase factor in %.
A = AverageAnnual Water Yield in Acre Feet.

Assumptions

F= 0.35 for considering local soil types, precipitation patterns, climate and timber types.

Subwatersheds	Existing ECA (acres)	R (feet)	A (acre-feet)	F (%)	I (%)	Subwatershed Acreage	ECA Acreage	Existing ECA (%)
0008-4	1688.47	0.70	5676.00	35%	7%	8622.38	1688.47	20%
0009-1	2551.17	0.59	8706.42	35%	6%	14837.36	2551.17	17%
0009-2	4376.79	0.59	11465.72	35%	8%	19539.72	4376.79	22%
0009-4	881.73	0.59	7204.30	35%	3%	12277.46	881.73	7%
0009-5	354.32	0.59	2298.22	35%	3%	3916.59	354.32	9%
0009-6	38.13	0.59	728.22	35%	1%	1241.71	38.13	3%
0010-1	1232.70	0.30	2243.68	35%	6%	7406.53	1232.70	17%
0010-2	2279.36	0.30	2301.83	35%	10%	7598.46	2279.36	30%
0010-3	1708.49	0.30	1802.40	35%	10%	5949.83	1708.49	29%
0010-4	1172.25	0.30	10201.19	35%	1%	33674.71	1172.25	3%
0010-6	912.90	0.30	2032.84	35%	5%	6710.51	912.90	14%
0010-7	108.30	0.30	702.97	35%	2%	2320.55	108.30	5%

Table 2. ECA Calculations

Calculation of existing ECA

Subwatersheds	Roaded Length	Roaded Acreage	Estimated ECA Acreage from VSS Classes							Partial Cut Acreage	Recovery Factor	Total ECA Acreage
			VSS 1	VSS 2	VSS 3	VSS 4a	VSS 4b	VSS 5	VSS 6			
0008-4	27054.47	18.63	1468			210				832	0.75	1688.47
0009-1	54146.27	37.29	1683.08		680	178		20.4	150.2	704	0.8	2551.17
0009-2	83258.36	57.34	3428.072	305	801	10.5	156.5	44.8	138.4	847	0.8	4376.79
0009-4	24179.18	16.65	496.8814			328				417	0.8	881.73
0009-5	18867.55	12.99	380.4078			28.7			20.8		0.8	354.32
0009-6	3250.19	2.24	12.53		0	32.9					0.8	38.13
0010-1	31789.29	21.89	843.5129		150	98	22	47	219	83	0.85	1232.70
0010-2	35619.38	24.53	2330.247	0	51	33	104	102	18	32	0.85	2279.36
0010-3	34252.65	23.59	1236.749	0	18	59	12	83	490	149	0.85	1708.49
0010-4	136891.37	94.28	246.9554			1002				61	0.85	1172.25
0010-6	25526.96	17.58	527.1815	0	86	39	234	14	18	235	0.85	912.90
0010-7	3310.65	2.28	16.1314	0	14	0	20	64	11	0	0.85	108.30

Sum of ACRES		VSS Both							
WATERS	SUB	1	3	5	6	42	Grand Total		
0009	1	1683.077791	212.147614	66.932823	491.50587	656.57345	3110.237548		
0009 Total		1683.077791	212.147614	66.932823	491.50587	656.57345	3110.237548		
Grand Total		1683.077791	212.147614	66.932823	491.50587	656.57345	3110.237548		

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	1683.08	100%	0%	1683.08	0.00	1.00	1683.08
3	1441.00	100%	0%	1441.00	0.00	0.90	1296.9
5	452.90	55%	45%	249.10	203.81	0.10	20.3805
42	4460.80	60%	40%	2676.48	1784.32	0.10	178.432
6	3338.80	55%	45%	1836.34	1502.46	0.10	150.246
Total Acreag	11376.58						3329.04

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	2	3	5	6	41	42	Grand Total
0009	2	3428.071751	84.921934	207.725699	262.179492	807.712576	81.298091	1037.814931	5909.724474
0009 Total		3428.071751	84.921934	207.725699	262.179492	807.712576	81.298091	1037.814931	5909.724474
Grand Total		3428.071751	84.921934	207.725699	262.179492	807.712576	81.298091	1037.814931	5909.724474

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	3428.07	100%	0%	3428.07	0.00	1.00	3428.07
2	305.00	100%	0%	305.00	0.00	1.00	305
3	890.00	100%	0%	890.00	0.00	0.90	801
5	1120.00	60%	40%	672.00	448.00	0.10	44.8
41	300.00	65%	35%	195.00	105.00	0.10	10.5
42	4470.00	65%	35%	2905.50	1564.50	0.10	156.45
6	3460.00	60%	40%	2076.00	1384.00	0.10	138.4
Total Acreag	13973.07			10471.57	3745.39		4884.22

Sum of ACRES		VSSBOTH							
WATERSHED	SUB	1	5	42	Grand Total				
0009	3	171.708743	64.041809	29.115084	264.865636				
0009 Total		171.708743	64.041809	29.115084	264.865636				
Grand Total		171.708743	64.041809	29.115084	264.865636				

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	Basal Area Removed	Adjusted ECA
1	171.71	100%	0%	171.71	0.00	0.00	171.71
5	64.04						
42	29.12						
Total Acreag	264.87						171.71

Sum of ACRES		VSSBOTH		
WATERS	SUB	1	42	Grand Total
0009	4	496.881354	8.368718	505.250072
0009 Total		496.881354	8.368718	505.250072
Grand Total		496.881354	8.368718	505.250072

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	496.88	100%	0%	496.88	0.00	0.00	496.88
42	8200.00	60%	40%	4920.00	3280.00	0.10	328
Total Acreag	8696.88						824.88

Sum of ACRES	VSSBOTH			
WATERS SUB	1	6	42	Grand Total
0009 5	380.407814	217.021179	321.776826	919.205819
0009 Total	380.407814	217.021179	321.776826	919.205819
Grand Total	380.407814	217.021179	321.776826	919.205819

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	380.41	100%	0%	380.41	0.00	0.00	380.41
42	820.30	65%	35%	533.20	287.11	0.10	28.7105
6	520.10	60%	40%	312.06	208.04	0.10	20.804
Total Acreag	1720.81						429.92

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	42	Grand Total					
0009	6	12.527433	547.608999	560.136432					
0009 Total		12.527433	547.608999	560.136432					
Grand Total		12.527433	547.608999	560.136432					
		VSS Both Class	**VSS Acreage**	**Percent LIve**	**Percent Dead**	**Live Acreage**	**Dead Acreage**	**ET Adjustment**	**Adjusted ECA**
		1	12.53	100%	0%	12.53	0.00	1.00	12.53
		42	940.30	65%	35%	611.20	329.11	0.10	32.9105
		Total Acreag	952.83						45.44

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	3	5	6	41	42	Grand Total	
0010	1	843.512857	150.073364	349.821648	784.206332	80.766368	183.367299	2391.747868	
0010 Total		843.512857	150.073364	349.821648	784.206332	80.766368	183.367299	2391.747868	
Grand Total		843.512857	150.073364	349.821648	784.206332	80.766368	183.367299	2391.747868	

	VSS Both Class	VSS Acreage	Percent Live	Percent Dead	Live Acreage	Dead Acreage	Basal Area Removal	Adjusted ECA
	1	843.51	100%	0%	843.51	0.00	1.00	843.51
	3	150.07	100%	0%	150.07	0.00	0.90	150.07
	5	1502.00	35%	65%	525.70	976.30	0.10	97.63
	41	360.00	40%	60%	144.00	216.00	0.10	21.60
	42	781.00	40%	60%	312.40	468.60	0.10	46.86
	6	3365.00	35%	65%	1177.75	2187.25	0.10	218.73
	Total Acreag	7001.59			3153.44	4398.25		1378.40

Sum of ACRES	VSSBOTH						
WATERS SUB	1	3	5	6	41	42	Grand Total
0010 2	2330.246898	126.989612	179.960678	99.78771	718.005413	686.443601	4141.433912
0010 Total	2330.246898	126.989612	179.960678	99.78771	718.005413	686.443601	4141.433912
Grand Total	2330.246898	126.989612	179.960678	99.78771	718.005413	686.443601	4141.433912

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	2330.25	100%	0%	2330.25	0.00	1.00	2330.25
3	126.99	100%	0%	126.99	0.00	0.40	50.80
5	545.00	40%	60%	218.00	327.00	0.10	32.70
41	2078.00	50%	50%	1039.00	1039.00	0.10	103.90
42	2030.00	50%	50%	1015.00	1015.00	0.10	101.50
6	297.00	40%	60%	118.80	178.20	0.10	17.82
Total Acreage	7407.24			4848.04	2559.20		2636.96

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	3	5	6	41	42	Grand Total	
0010	3	1236.749078	42.545044	185.672186	839.982895	54.800434	469.046005	2828.795642	
0010 Total		1236.749078	42.545044	185.672186	839.982895	54.800434	469.046005	2828.795642	
Grand Total		1236.749078	42.545044	185.672186	839.982895	54.800434	469.046005	2828.795642	

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	1236.75	100%	0%	1236.75	0.00	1.00	1236.75
3	42.55	100%	0%	42.55	0.00	0.40	17.02
5	560.00	30%	70%	168.00	392.00	0.15	58.80
41	187.00	35%	65%	65.45	121.55	0.10	12.16
42	1280.00	35%	65%	448.00	832.00	0.10	83.20
6	4670.00	30%	70%	1401.00	3269.00	0.15	490.35
Total Acreag	7976.29			3361.74	6021.69		1898.27

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	41	Grand Total					
0010	4	246.955433	159.924871	406.880304					
0010 Total		246.955433	159.924871	406.880304					
Grand Total		246.955433	159.924871	406.880304					
		VSS Both Class	**VSS Acreage**	**Percent LIve**	**Percent Dead**	**Live Acreage**	**Dead Acreage**	**ET Adjustment**	**Adjusted ECA**
		1	246.96	100%	0%	246.96	0.00	1.00	246.96
		41	20056.00	50%	50%	10028.00	10028.00	0.10	1002.8
		Total Acreage	20302.96			10274.96	10028.00		1249.76

Sum of ACRES	VSSBOTH	
WATERS SUB	1	Grand Total
0010 5	12.924231	12.924231
0010 Total	12.924231	12.924231
Grand Total	12.924231	12.924231

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	Adjusted ET	Adjusted ECA
1	12.92	100%	0%	12.92	0.00	0.00	12.92
42	5000.00	35%	65%	1750.00	3250.00	0.1	325
Total Acreage	5012.92			1762.92	3250.00		337.92

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	3	5	6	41	42	Grand Total	
0010	6	527.181533	215.558368	32.603912	36.944379	97.807625	585.787296	1495.883113	
0010 Total		527.181533	215.558368	32.603912	36.944379	97.807625	585.787296	1495.883113	
Grand Total		527.181533	215.558368	32.603912	36.944379	97.807625	585.787296	1495.883113	

VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Adjustment	Adjusted ECA
1	527.18	100%	0%	527.18	0.00	1.00	527.18
3	215.56	100%	0%	215.56	0.00	0.40	86.22335
5	240.00	40%	60%	96.00	144.00	0.10	14.4
41	780.00	50%	50%	390.00	390.00	0.10	39
42	4680.00	50%	50%	2340.00	2340.00	0.10	234
6	300.00	40%	60%	120.00	180.00	0.10	18
Total Acreage	6742.74			3688.74	4811.36		918.80

Sum of ACRES		VSSBOTH							
WATERS	SUB	1	3	5	6	42	41	Grand Total	
0010	7	16.134129	35.362255	507.173046	311.884659	345.737152	227.431656	1443.722897	
0010 Total		16.134129	35.362255	507.173046	311.884659	345.737152	227.431656	1443.722897	
Grand Total		16.134129	35.362255	507.173046	311.884659	345.737152	227.431656	1443.722897	

	VSS Both Class	VSS Acreage	Percent LIve	Percent Dead	Live Acreage	Dead Acreage	ET Removal	Adjusted ECA
	1	16.13	100%	0%	16.13	0.00	1.00	16.13
	3	35.36	100%	0%	35.36	0.00	0.40	14.144
	5	770.00	40%	60%	308.00	462.00	0.10	46.2
	42	396.00	50%	50%	198.00	198.00	0.10	19.8
	6	182.00	40%	60%	72.80	109.20	0.10	10.92
	41	302.00	50%	50%	151.00	151.00	0.10	15.1
	Total Acreag	1701.49			781.29	1602.49		122.30

APPENDIX 6

Road Density Analysis

This analysis is planned for fall/winter 1996.
When complete, a map will be added to this appendix showing miles of various grades of road per square mile of land in the Trout Slope assessment area.

APPENDIX 7

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